

# Introduction to Information Technology

## study questions

*Note:* These questions will be the source for assignments and quizzes. The recommended way to use them is to sample them, seeing which subtopics have questions that seem easily answered and which have questions that are harder for a student. Students may wish to give further study to subtopics with harder questions.

### Introduction

1. Formatting
2. Spreadsheets
3. Database
4. Hardware and Operating Systems
5. Networked computing and the Internet
6. Problem solving and programming
7. Social and professional issues

### Multiple topics

# Study questions on Introduction

## Multiple choice

### 1. Starting out

1. This course claims to offer (a) facts; (b) a place to think about thinking; (c) a place to think about technology; (d) a place to think about thinking about technology; (e) answers
2. Computer literacy includes (a) details of the MS Office interface; (b) readiness to learn future technologies; (c) knowledge of programming languages; (d) ability to use specific formatting features of Excel; (e) none of these
3. The instructor has shown (a) extensive theoretical knowledge; (b) acknowledged wisdom; (c) a summary of spreadsheet concepts; (d) curiosity; (e) how to format a document
4. The basic objectives of the course include (a) memorizing facts; (b) agreeing with the instructor; (c) agreeing with the textbook; (d) working in a team; (e) writing programs
5. The basic objectives of the course include (a) memorizing facts; (b) agreeing with the instructor; (c) agreeing with the textbook; (d) presenting to a group; (e) writing programs
6. The basic objectives of the course include (a) memorizing facts; (b) agreeing with the instructor; (c) agreeing with the textbook; (d) documenting research; (e) writing programs

### 2. What is information technology?

1. Consider the following eras: (i) Internet-connected computers; (ii) mainframe computers; (iii) locally-networked PCs. Computing has proceeded from (a) i to ii to iii; (b) ii to i to iii; (c) iii to ii to i; (d) iii to i to ii; (e) ii to iii to i
2. Data always (a) takes the form of sequences of symbols; (b) is analog; (c) includes meaning; (d) conveys knowledge; (e) none of these
3. Information always (a) takes the form of sequences of symbols; (b) is analog; (c) includes meaning; (d) conveys knowledge; (e) none of these
4. Data with meaning is always (a) binary; (b) in words or numbers; (c) information; (d) accurate; (e) none of these
5. Information technology is always (a) a department; (b) tools and devices for processing meaningful data; (c) hardware; (d) software; (e) none of these
6. Which is *not* considered a feature of IT? (a) exponential rise in computing power; (b) ubiquity of computation; (c) convergence of ideas and tastes; (d) connectivity of all people and devices; (e) relentless changes and paradigm shifts

7. Knowledge in an area is *scalable* if (a) there is a great quantity of it; (b) there is a way to extend it to new areas or contexts; (c) it can be quantified; (d) it can be weighed; (e) none of these
8. Information management includes (a) hiring and firing; (b) storage, retrieval, and invention; (c) retrieval, organization, and disk-formatting; (d) retrieval, organization, and storage; (e) none of these
9. Problem-solving skills (a) are irrelevant to IT fluency; (b) include specification but not planning; (c) include planning but not analysis; (d) involve analytical and abstract thinking; (e) none of these
10. Fluency with IT is said to require (a) skills only; (b) skills, concepts, and capabilities; (c) knowledge of HTML and SQL; (d) the knowledge to use Microsoft Office; (e) none of these
11. We have seen \_\_\_\_ definition(s) of “information technology” (a) 0; (b) 1; (c) 2; (d) more than 2; (e) many
12. Change in IT is (a) nonexistent; (b) slow; (c) rapid; (d) steady; (e) none of these
13. One major objective of IT is to (a) create new tasks; (b) automate manual tasks; (c) enable reuse of effort; (d) reduce human management of information; (e) none of these
14. Abstraction (a) places a detail in its context; (b) removes details; (c) adds details; (d) removes general principles; (e) none of these

### 3. Format, objectives, and grading

1. Emphasis in this course is said to be on (a) lectures; (b) slides; (c) discussion and interaction; (d) right answers; (e) memorizing
2. Central classroom guidelines are (a) taking notes and getting facts; (b) attending class and being on time; (c) focus and mutual respect; (d) listening and remembering; (e) none of these
3. Attainment of objectives counts for \_\_\_\_% of final grade in this course (a) 0; (b) 10; (c) 30; (d) 50; (e) 100
4. Assignments count for \_\_\_\_% of final grade in this course (a) 0; (b) 10; (c) 30; (d) 50; (e) 100
5. Multiple-choice quizzes count for \_\_\_\_% of final grade in this course (a) 0; (b) 10; (c) 30; (d) 50; (e) 100
6. Problem-solving quizzes count for \_\_\_\_% of final grade in this course (a) 0; (b) 10; (c) 30; (d) 50; (e) 100
7. Final exam counts for \_\_\_\_% of final grade in this course (a) 0; (b) 10; (c) 30; (d) 50; (e) 100
8. Preparation and participation count for \_\_\_\_% of final grade in this course (a) 0; (b) 10; (c) 30; (d) 50; (e) 100
9. In this classroom assignments are accepted (a) only on time; (b) late with penalty; (c) late without penalty; (d) as written by two or more students; (e) none of these

10. Email etiquette allows *omission* of (a) helpful subject line; (b) salutation; (c) good spelling; (d) references; (e) none of these
11. Direct use of text found on the Internet (a) is free without attribution; (b) requires a reference; (c) requires quoting and a reference; (d) costs money; (e) none of these
12. Academic honesty is a concern of (a) students; (b) instructors; (c) the College; (d) entertainers; (e) the Student Life office
13. Plagiarism is (a) claiming another person's work as one's own; (b) copying exam answers; (c) copying exam questions; (d) unauthorized collaboration; (e) none of these
14. Cases of alleged academic dishonesty (a) stay between student and instructor; (b) are discussed among instructors; (c) may go to the office of the Dean of Students; (d) are adjudicated in court; (e) none of these

### **Short answer**

1. Which definition of information technology do you think is best?
2. Are these instances of information technology? (a) laser pen; (b) cell phone; (c) piece of chalk
3. What is the term for sequences of symbols?
4. What is the term for meaningful data?
5. What is the term for the processing of symbols with input and output?
6. What is computing?
7. What is information?
8. What is data?
9. What is the term for data and its meaning?
10. What is the term for innovative tools?
11. What is the term for digital tools for processing data?
12. What are the features of IT fluency?
13. What kind of thinking breaks down things or concepts into their components?
14. What kind of thinking separates details from a basic concept, idea, or process?

# Study questions on topic 1 (Formatting)

## Multiple choice

### 1. Operating systems and interfaces

1. The screen image in a Windows system may be saved to the Clipboard using (a) Paint; (b) Copy; (c) PrtScr; (d) NumLock; (e) none of these
2. An operating system provides services for (a) applications; (b) remote sites; (c) hardware; (d) Microsoft Corp.; (e) surgeons
3. Right-clicking on an object (a) opens or executes it; (b) deletes it; (c) selects it; (d) displays its operations and attributes; (e) none of these
4. Which is *not* an operating system: (a) Linux; (b) Internet Explorer; (c) Windows; (d) Mac OS; (e) all are operating systems
5. A GUI is (a) application software; (b) operating-system software; (c) hardware; (d) hardware and software; (e) none of these
6. A memory manager is (a) application software; (b) operating-system software; (c) hardware; (d) hardware and software; (e) none of these
7. Internet Explorer is (a) application software; (b) operating-system software; (c) hardware; (d) hardware and software; (e) none of these
8. Windows is (a) application software; (b) hardware; (c) a Web app; (d) an operating system; (e) none of these
9. LINUX is (a) application software; (b) hardware; (c) a Web app; (d) an operating system; (e) none of these
10. All file systems today are (a) virtual; (b) hierarchical; (c) networked; (d) sequential-access; (e) none of these
11. A Windows shortcut or UNIX alias is a (a) file that links to a file or subdirectory; (b) macro; (c) set of steps known by techies; (d) quick way to delete information; (e) none of these
12. Windows Explorer is (a) application software; (b) operating-system software; (c) hardware; (d) hardware and software; (e) none of these
13. Application software (a) serves operating systems and users; (b) is served by operating systems; (c) serves applications; (d) is subordinate to the hardware; (e) none of these
14. A file system is hierarchical in that it (a) gives orders; (b) receives orders; (c) makes some entities more important than others; (d) nests entities within entities; (e) none of these
15. A standard file system is (a) egalitarian; (b) organized manually; (c) hierarchical; (d) accessed only by applications; (e) none of these
16. The Clipboard is in (a) an application; (b) memory; (c) a disk file; (d) a web site; (e) user's memory
17. Applications share data via (a) web sites; (b) the Clipboard; (c) DVDs; (d) flash memory; (e) none of these

### 2. Application software

1. Which of the following is *not* an office suite? (a) Windows; (b) MS Office; (c) Google Docs; (d) Open Office; (e) all are office suites
2. MS Word is (a) application software; (b) operating-system software; (c) hardware; (d) hardware and software; (e) none of these
3. Excel is (a) application software; (b) operating-system software; (c) hardware; (d) hardware and software; (e) none of these
4. PowerPoint is (a) application software; (b) operating-system software; (c) hardware; (d) hardware and software; (e) none of these
5. "Form follows function" means that (a) function keys help fill out forms; (b) apps with similar purposes have similar interfaces; (c) we first learn how to do things, then why; (d) there is little relation between tasks and their software implementation; (e) none of these
6. In learning to use computer systems (a) we focus on what mouse clicks to use; (b) we focus on tasks before means; (c) we should not expect erroneous results if we do our jobs; (d) when stuck, we persist rather than ever starting over; (e) none of these

### 3. Text formatting

1. Named styles are an example of (a) slick hardware; (b) system software; (c) global control of formatting; (d) relative referencing; (e) none of these
2. An MS Word named style is like the PowerPoint Master Slide View in that (a) it is stored on disk; (b) it is stored in the processor; (c) it is hardware; (d) it offers global control of formatting; (e) none of these
3. Tables (a) have no special formatting; (b) are supported by Word but not HTML; (c) are supported by HTML but not by Word; (d) are supported by Word and HTML; (e) none of these
4. Vertical spacing is considered best provided by (a) the space-after paragraph attribute; (b) pressing the space bar; (c) pressing Enter twice; (d) features only available to experts; (e) none of these
5. To be able to control the formatting of all headers in a document at once, it is recommended to use (a) table of contents; (b) print view; (c) named styles; (d) search and replace; (e) none of these
6. Text that is embedded in a grid is efficiently done using (a) named styles; (b) the *tables* feature; (c) page footer; (d) automatic numbering; (e) none of these
7. A more widely readable file type for formatted text than MS Word's *.doc* is (a) *.xls*; (b) *.txt*; (c) *.pdf*; (d) *.ppt*; (e) *.exe*
8. Paragraph attributes include (a) color; (b) font style; (c) font size; (d) indent; (e) none of these
9. Paragraph attributes include (a) color; (b) font style; (c) font size; (d) space-after; (e) none of these

10. Paragraph attributes include (a) color; (b) font style; (c) font size; (d) alignment; (e) none of these
  11. Paragraph attributes include (a) color; (b) font style; (c) font size; (d) numbering; (e) none of these
  12. Automatic tables of contents require (a) a special file; (b) use of named styles; (c) training; (d) use of the *Page Layout* menu; (e) none of these
  13. Create a PDF file from a MS Word file requires (a) a special application; (b) a special Windows tool; (c) exporting; (d) importing; (e) none of these
  14. Exporting enables (a) reading data from the Internet; (b) uploading data to the Internet; (c) saving an MS Word file as a web page; (d) reading an HTML file into a text formatter; (e) none of these
  15. Text that can appear automatically in a printed document includes (a) exported data; (b) page headers; (c) section headings; (d) tables of contents; (e) named styles
  16. Collaboration among people working on the same document is aided by (a) Track Changes; (b) page headers; (c) named styles; (d) search engines; (e) blogs
4. To convert an MS Word file to HTML (a) requires an expert; (b) requires reformatting; (c) requires *SaveAs*; (d) requires conversion software; (e) none of these
  5. An HTML file consists of (a) displayable and uneditable characters; (b) formatting text and displayable tags; (c) formatting tags and displayable text; (d) displayable text and the contents of the pages hyperlinked-to; (e) none of these
  6. Hyperlinks (a) contain the content linked to; (b) contain the URLs of content linked to; (c) are a way of formatting text; (d) reference graphics files to display in a web page; (e) none of these
  7. Graphics are normally included in HTML (a) by embedding the image in the HTML; (b) by hyperlinking; (c) by the tag `<img>` with a file name; (d) by the tag `<img>` with a URL; (e) none of these
  8. `<html>` is (a) a script; (b) a tag; (c) a format specification; (d) text to display; (e) none of these
  9. HTML supports formatting features using (a) tags; (b) operators; (c) methods; (d) user commands; (e) none of these

#### 4. Presentation graphics

1. Which of the following is considered a graphical file format? (a) *.xls*; (b) *.ppt*; (c) *.gif*; (d) *.exe*; (e) all are graphical file formats
2. Master Slide View in PowerPoint is an example of (a) slick hardware; (b) system software; (c) global control of formatting; (d) relative referencing; (e) none of these
3. Page and slide footers are an example of (a) slick hardware; (b) system software; (c) global control of formatting; (d) relative referencing; (e) none of these
4. PowerPoint supports global control of formatting through (a) named styles; (b) slide footers; (c) manual intervention; (d) paranormal intervention; (e) none of these
5. The creator of a slide may conveniently save notes (a) with a slide; (b) in a separate file; (c) on paper; (d) not at all; (e) none of these
6. To rearrange content of a *.ppt* file, use (a) master view; (b) print view; (c) slide sorter view; (d) Windows Explorer; (e) none of these

#### 5. Web-page design

1. An internal hyperlink is different from an external one in that (a) it references a location in the same file that contains the hyperlink; (b) it is in the HTML file; (c) it is on the server; (d) it is on the user's computer
2. In web pages, images are normally (a) embedded in an HTML file; (b) stored in separate files from the HTML file; (c) inaccessible; (d) stored in PDF files; (e) none of these
3. HTML uses \_\_\_\_ to format text (a) control codes; (b) WYSIWYG; (c) highlight-and-select; (d) tags; (e) none of these

### Short answer

#### 1a. Operating systems and applications

1. What class of software offers services to applications, and what services?
2. What services do operating systems offer and to what other kind of software?
3. What broad category of software does a word-processing program belong to?
4. Define operating systems and name two.
5. What keypress places the screen image on the Clipboard?
6. How is it possible for a single processor to execute multiple computer programs concurrently?
7. In what sense does an operating system manage memory?
8. Explain ways that an application like MS Word makes use of an operating system.
9. Distinguish operating-system from application software. How do they interact?
10. A device driver provides the interface between what kind of software and what kind of hardware?
11. In Windows and some other user interfaces, what does right-clicking on an object enable the user to do?
12. Relate the following: mouse pointer, cursor, Insertion Point.
13. What does the Clipboard store and in what part of the hardware is the Clipboard located?
14. What steps are recommended, in order, if an application stops responding?
15. How do you make a window disappear while leaving it available in the Task Bar?
16. What happens if you double-click a file whose name ends, ".exe"?

17. Order the following according to distance from the user's perception: operating system, application, hardware
18. Why is data backup considered necessary?
19. What are two methods of data backup?

### 1b. File systems

1. What is hierarchical about the Windows file system?
2. What are files and how are they organized and stored?
3. In an IT context, what is a folder and what can it contain?
4. Is a shortcut to a folder itself a folder? Explain why or why not.
5. Is your network account icon, in My Computer, a physical disk drive? Explain.
6. Are all the files in a folder located in the same part of a disk? Explain.
7. What are the attributes of a file system and what kind of software implements it?

### 1c. Text formatting

1. Suppose you were asked at work to prepare a professional report about a large project. What formatting elements might you use to work efficiently to make the information meaningful and accessible to readers? Give specifics and justify.
2. In what ways do you think differently now about word processing than before we discussed this topic?
3. Describe four paragraph attributes.
4. What are three kinds of indent?
5. How would you format paragraphs so that an extra line space appears after every paragraph?
6. How would you format a series of paragraphs so that they were numbered 1 to 10?
7. How would you make sure that all lines of a paragraph stay on the same page?
8. How would you make sure that two consecutive words always stay on the same line together?
9. What method for vertical spacing is considered better than pressing the Enter key twice?
10. Describe an efficient process of numbering elements of a list in a word-processing document.
11. Distinguish a page header from a section heading.
12. What is the recommended way to put numbers to the left of lines of text in a word-processing program?
13. Name the feature of MS Word used to display changes made to a document.
14. What is one way to create a logo, and include it in a document, using the MS Office applications?
15. What is the name of the process of bringing into an application a file created by a different application?
16. Compare bitmap and vector formats for pictorial data.
17. What does "export" mean, in a desktop application?
18. What does "import" mean, in a desktop application?
19. What occurs when an application saves a file in a format different from the application's standard format?

20. What are some export file formats supported by the word-processing application you use?
21. What is the name for saving a document in a different format from the application that created it?
22. What keypress saves a screen image? Where is it saved?
23. What does "form follows function" mean?
24. To end the current operation in an application, what keypress usually works?
25. What is an advantage of using two *file-compatible* applications?
26. How are all the slides in a presentation given a common format?
27. How is paragraph spacing controlled in PowerPoint?
28. Distinguish the <head> tag from <h1> in HTML.

### 1e. Global control of formatting

1. How is global control of formatting implemented in MS Word and PowerPoint?
2. How does a user avoid repetitious tasks like formatting text the same way over and over?
3. How and why are MS Word named styles used, rather than just formatting blocks of text with the *Font* and *Paragraph* dialogs?
4. Describe how you might format a long word-processing document in such a way that the font of the subheadings can easily be changed later.
5. What is global control of formatting? Give an MS Word example.
6. What formatting step is necessary when automatically generating a table of contents in MS Word? What general principle is applied by this feature?
7. Explain the common advantage that is offered by PowerPoint Master Page, MS Word Page Header View, and named styles.
8. What does Track Changes enable?
9. How is global control of formatting implemented in HTML?
10. How is global control of formatting implemented in PowerPoint?

### Longer answer

1. Download or register for an application suite among the following: Ajax Write (and others in Ajax suite); Google Documents; OpenOffice. Compare features and user interfaces. Find what features that you use already are supported in these alternative suites; find out what features that are listed in the Semester Project, #1 and #2, are supported. Compare styles of user interface with MS Office. Say what characteristics you like and don't like. Write up results of your work as a PowerPoint or as presentation notes, and post on Discussion Board, Topic 1 (Formatting) under this Group Work forum. Include names of students who participate in your group. Organize your group with roles including those of expeditor, recorder, and reporter. Be ready to report in class.

2. Using SharePoint, FrontPage, or Windows Notepad as a text editor, create from scratch a web page in HTML that uses material about your business or organization. The web page should contain:
  - a. a *comment* at the top of the HTML file (but invisible in the web page display), that gives your name, the date, the course number, and the homework number;
  - b. a *title*, to appear in the blue bar at the top of the Internet Explorer window;
  - c. multi-paragraph text, some of which is bold or italicized and some of which uses *headings styles* such as <h1>, <h2> (see *HTML Reference* handout);
  - d. a hyperlink (e.g., to a web site related in some way to your organization or business);
  - e. a picture (your logo), scaled to about 1 or 2 inches high as displayed on your monitor (or about 100 x 100 pixels);
  - f. a horizontal rule;
  - g. a background color;
  - h. an HTML *table* coded from scratch containing some info from the MS Word table that you created for HW 2.
  - i. a bulleted or numbered list;
  - j. a definition and uses of the <h1> style;
  - k. a table of contents using internal hyperlinks.

*To retrieve example files posted on Discussion Board:* open the example message, right-click on the .htm file name, save the file at your user account space, open it in MS Office Sharepoint Designer. Code your work in the Code view of Sharepoint. To be sure that your HTML file appears as you intend, use Design View. Double-click on your HTML file in its directory to show it in a browser.
3. Why are there:
  - (a) word-processor programs
  - (b) standard user interfaces
  - (c) changes in standard user interfaces
  - (d) alternatives to MS Office
  - (e) languages like HTML
  - (f) named styles

# Study questions on topic 2 (Spreadsheets)

## Multiple choice

### 1. Principle: A matrix with calculated values

- One of the chief features that distinguish a spreadsheet from a word processor is (a) styles; (b) formatting; (c) export features; (d) calculated formulas; (e) none of these
- A spreadsheet is a (a) sequential list; (b) tree; (c) network; (d) grid or matrix; (e) text file
- Spreadsheets are used most in (a) text formatting; (b) database querying; (c) decision support; (d) software design; (e) web posting
- Automatic calculation of values is a principle of (a) word processing; (b) presentation graphics; (c) web posting; (d) spreadsheet software; (e) application design
- Spreadsheet cells may contain
  - named styles
  - Labels
  - numbers
  - Formulas
 (a) i, ii, and iii; (b) i, ii, and iv; (c) ii and iii; (d) ii, iii, and iv; (e) iii and iv
- Spreadsheet rows are denoted by (a) numbers; (b) letters; (c) words; (d) hyperlinks; (e) none of these
- Spreadsheet columns are denoted by (a) numbers; (b) letters; (c) words; (d) hyperlinks; (e) none of these
- Spreadsheet formulas begin with (a) a number; (b) a cell reference; (c) =; (d) +; (e) (
- A rule for information integrity is to use formulas to generate (a) all values; (b) no values; (c) any values that are important; (d) any values that depend on other values; (e) none of these
- Spreadsheets are useful to look at (a) what-if scenarios; (b) web pages; (c) analysis of text; (d) programming code; (e) none of these

### 2. Cell referencing

- B3:G3 is a (a) value; (b) format; (c) range; (d) formula; (e) none of these
- A well-designed budget spreadsheet may well contain a cell (a) that references a value computed in the non-budget part of the spreadsheet; (b) that contains a range as its value; (c) that contains a literal that could be computed from another number in the budget; (d) that references another cell that references the current cell; (e) none of these
- A circular reference (a) is a relative reference; (b) is an absolute reference; (c) is a reference that traces back to its own cell; (d) is a range; (e) none of these
- \_\_\_ referencing is always an error (a) absolute; (b) relative; (c) circular; (d) cell; (e) none of these

- A range is specified by (a) 25; (b) =A2; (c) G3:G20; (d) =sum(A2, A3); (e) none of these
- A3 is a (a) relative reference; (b) absolute reference; (c) ambiguous reference; (d) range; (e) literal
- A\$5 is a case of (a) relative reference; (b) absolute reference; (c) ambiguous reference; (d) range; (e) literal
- Relative referencing matters mainly in (a) formula calculation; (b) formula copying; (c) data entry; (d) formula deletion; (e) none of these
- Absolute referencing matters mainly in (a) formula calculation; (b) formula copying; (c) data entry; (d) formula deletion; (e) none of these
- If a cell value is referenced often, it is useful to \_\_\_ it (a) copy; (b) delete; (c) name; (d) calculate; (e) none of these
- =*budget!*A5 uses (n) (a) absolute reference; (b) range; (c) reference to a cell in a different worksheet; (d) reference to a named column; (e) none of these

### 3. Named functions

- To solve a loan amortization problem with a spreadsheet, it is sufficient to use (a) the SUM function; (b) a range; (c) an expression that uses the operations of addition, subtraction, multiplication, and division; (d) the PMT function; (e) none of these is sufficient
- Which of the following may not be in the cell of a spreadsheet? (a) multiple values; (b) a formula; (c) a function call; (d) a literal numeric value; (e) a label
- =*sum*(B3:G3) is a (a) a literal; (b) a format; (c) a query; (d) a spreadsheet formula; (e) none of these
- MAX is a (a) named cell; (b) reference; (c) label; (d) named function; (e) none of these
- COUNT is a (a) named cell; (b) reference; (c) label; (d) named function; (e) none of these
- AVERAGE is a (a) named cell; (b) reference; (c) label; (d) named function; (e) none of these
- SUM is a (a) named cell; (b) reference; (c) label; (d) named function; (e) none of these
- To solve a problem in which a value is referenced from a table in a spreadsheet, use (a) TABLE; (b) SUM; (c) =; (d) PMT; (e) VLOOKUP
- IF is a (a) label; (b) named cell; (c) reference; (d) range; (e) logical operator
- AND is a (a) label; (b) named cell; (c) reference; (d) range; (e) logical operator
- OR is a (a) label; (b) named cell; (c) reference; (d) range; (e) logical operator
- To determine what price we can afford for an item in our budget, given a certain monthly payment and rate of interest, we use (a) PMT; (b) VLOOKUP; (c) SUM; (d) goal seeking; (e) relative referencing

## Short answer

### 2a. Formulas

- Why are formulas used, and when?
- The course materials recommend that all numbers in a spreadsheet be specified in a certain way if they depend on other numbers. What is that way and what is the reason it is used?
- When and why is it recommended to use formulas in spreadsheets, when entering the numbers might sometimes be just as convenient?
- How is data integrity maintained in spreadsheets?
- If you had a piece of numeric data on one worksheet of a spreadsheet file, and wanted to put it into a different worksheet as well, how would you do that?
- Giving your reasoning, comment on the following solution to the problem of displaying the sum of a column of monthly sales figures in a spreadsheet: "It's easy to see by adding in our heads that the figures add up to \$12,234, so we'll enter that figure in the cell." What general principle is involved here?
- Write formulas to calculate sums of each row and each column of a grid of numbers representing each of three products sold in each of four quarters:
 

159	250	195	690
346	883	790	686
- Give two reasons why it is considered better to write formulas for sums, averages, and so forth, in spreadsheets, rather than type in all the numbers.

### 2b. Cell referencing

- If the formula "`=B2+C2`" is copied from cell D2 to D3, what will the new formula be? What is the principle behind what happens?
- What is a *range* used for in spreadsheets?
- What does "`B5:C8`" specify in Excel?
- If the formula "`=F6+E$5`" is copied to the cell below the cell containing the formula, what will the new formula be?
- What exactly does "`=budget!C6`" refer to, and how does it copy?
- What does "`=$C$6`" refer to, and how does it copy? What special feature is this kind of formula said to contain?
- Distinguish absolute from relative references.
- When should absolute references be used, and how are they specified?
- What is an advantage of using named cells in a spreadsheet?

### 2c. Named functions

- How are *parameters* used in spreadsheets? Give an example.
- How would you display the largest sales figure in a row of such figures in a spreadsheet?
- Name two statistical functions available in a spreadsheet application and explain how they are used.

- How would you find out the monthly payment due for a 30-year mortgage on a house costing \$350,000 at 4.7% interest?
- Write formulas to calculate the monthly payment required on a 30-year loan of \$550K, at 7% interest.
- Write formulas to calculate the smallest value in a row of a spreadsheet table that includes cells C5 through J5.
- Describe an example of the use of VLOOKUP.
- Describe the IF function
- Describe the AND function
- Describe the OR function
- Write a formula that gives the *median* value of a list of values displayed horizontally.
- Write a formula that gives the number of non-empty cells in a range.
- Use a lookup table and formula to apply the labels "vapor", "liquid", or "ice" to the following observed water-temperature values (in °F): 100, 40, 0, 30, 300.
- Write a formula that finds the average value for a range of cells, *not* counting cells with zero or negative values
- Write a spreadsheet formula that displays the average of the values in cells B3, B4, and B5.

### 2d. Spreadsheet formatting

- How would you make sure that the value for a monetary value appears with a dollar sign and two digits after the decimal point in a spreadsheet?
- How would you format a cell so that a whole sentence could be displayed in it, on multiple lines?
- Specify a *clear* graphical way to show in a spreadsheet:
  - the relative values of categories of a budget;
  - the change in amounts of income over time?
- What does "`#####`" in a cell mean? How do you fix it?
- How would you make sure that the column headers in a spreadsheet stayed on the screen even when the user scrolled the data?
- How would you make sure that your spreadsheet data fits all on the same page when it is printed?
- What common formatting features are shared by word-processing and spreadsheet software?
- How would you cause the heading, "Budget for 2006," to appear centered above *two* columns of a spreadsheet?
- How would you cause negative numbers to appear formatted with parentheses instead of minus signs?
- For the following numbered features of spreadsheet software, describe the feature in your own words, give an example that you invent, and state how to access the feature in the spreadsheet application you are using.
  - Merging cells
  - Referencing cells in a different worksheet within one spreadsheet file
  - Pie chart with labels and amounts in or alongside pie slices
  - Line graph

- e. Arranging that scrolling a worksheet on the screen leaves column and row headings visible
- f. Border rules
- g. Three-dimensional charts
- h. Preventing cells from being edited
- i. Changing column width or row depth
- j. Fitting column width to widest item in column
- k. Making formulas visible when printing worksheet
- l. Copying a horizontal series of cells so they are stacked vertically
- m. Formatting numbers as currency, as in accounting
- n. Displaying numbers to a precision of two decimal places
- o. Word wrap
- p. Increase/decrease number of digits or precision

## 2e. Spreadsheets in business

1. What kind of chart would be appropriate for the expense categories of a business?
  2. What kind of chart would be appropriate for displaying spending on education for the years 2001-2005?
  3. What is a journal used for, and what are the components of a journal?
  4. What items do a journal and a budget have in common?
5. What items in a budget could be obtained from a journal using cell references?
  6. What is a graphical way to show the relative values of categories of a budget in a spreadsheet?
  7. What are the purposes and contents of a journal and of a budget, respectively? Describe how they may be used *together* in a spreadsheet. Refer to the use of formulas.
  8. Where are formulas used in a journal and a budget?

### Multi-objective

1. Suppose you were asked as part of a job to present a business plan that included some actual and projected numbers for income and expenses. How would you present this information, in a document that would enable visualization of relationships among items of data; changes in assumptions (what-if scenarios); and analysis or categorization of income and expense figures?
2. What are some ways to arrange numbers in a well organized and meaningful way in a business spreadsheet? Give specific features of spreadsheet software.
3. What are some ways to summarize a set of numbers about prices, compensation, or test scores? Give specific spreadsheet features.
4. In what ways do you think differently now about numeric business data than before we discussed spreadsheets?

## Study questions on topic 3 (Database)

### Multiple choice

#### 1. Entities and tables

1. A database normally consists of (a) pixels; (b) tables; (c) keys; (d) protocols; (e) none of these
2. In a database, an object or instance corresponds to a (a) record; (b) table; (c) bit; (d) relation; (e) all of these
3. In a database, an entity or class of objects is implemented by a (a) record; (b) table; (c) bit; (d) relation; (e) all of these
4. A database table's columns correspond to (a) records; (b) tables; (c) instances; (d) attributes; (e) all of these
5. A database table represents a (a) vector; (b) relation; (c) query; (d) formula; (e) list
6. A record is a(n) \_\_\_\_ of an entity (a) column; (b) field; (c) instance; (d) summary; (e) none of these
7. An attribute of a record is represented by a (a) column; (b) file; (c) instance; (d) summary; (e) none of these
8. An attribute of an entity is represented by a (a) column; (b) field; (c) instance; (d) summary; (e) none of these
9. A selection is a(n) (a) entity; (b) record; (c) view; (d) attribute; (e) none of these
10. A projection is a(n) (a) entity; (b) record; (c) view; (d) attribute; (e) none of these
11. An instance of an entity is a(n) (a) attribute; (b) column; (c) table; (d) record; (e) none of these

#### 2. Information integrity

1. To assure that all records are different, database designers use (a) a sort field; (b) queries; (c) data analysis (d) searches; (e) a primary key
2. Non-duplication of data in tables is enforced by use of (a) formulas; (b) primary keys; (c) formats; (d) protocols; (e) all of these
3. A join is a(n) (a) entity; (b) record; (c) view; (d) attribute; (e) none of these
4. Implementing a relationship between two entities involves a (a) selection; (b) projection; (c) join; (d) query; (e) none of these
5. A rule of information integrity is that (a) any fact must appear only once in a database; (b) any fact must appear more than once; (c) any fact must be part of the design of the database; (d) a fact can coexist with contradictory facts; (e) none of these
6. Use of a primary key ensures (a) redundancy; (b) non duplication; (c) clear setting of priorities; (d) correct calculation; (e) none of these

#### 3. Searching, sorting, summarizing data

1. A selection query corresponds to (a) a table; (b) a view; (c) a logical assertion; (d) a set of records; (e) all of these
2. To display information from a database, we use a (a) format command; (b) named style; (c) master page; (d) query; (e) all of these
3. An Excel filter corresponds to (a) a query; (b) a script; (c) a formula referencing a cell; (d) a JavaScript program; (e) an HTML file
4. A pivot table (a) is a kind of relation; (b) is a formula; (c) correlates independent and dependent variables; (d) is a feature of MS Word; (e) none of these
5. > may be useful in (a) entity design; (b) attribute choice; (c) table entry; (d) query writing; (e) none of these
6. Structured Query Language is useful with (a) spreadsheets; (b) text formatting; (c) databases; (d) web design; (e) none of these
7. Subtotals are useful in (a) MS Word; (b) database management; (c) mortgage amortization; (d) presentation graphics; (e) none of these
8. XML (a) is an alteration to HTML; (b) provides graphics support; (c) is a way to tag web data with semantic information; (d) is an extended machine language; (e) none of these
9. In a pivot table, (a) independent variables are correlated with each other; (b) dependent variables are correlated; (c) the effect of independent variables on dependent ones is shown; (d) the effect of dependent variables on independent ones is shown; (e) none of these

#### 4. DB management in business environments

1. Which of the following is *not* associated with database management? (a) query design; (b) table design; (c) global control of formatting; (d) entities and relationships; (e) all of these are associated
2. A professional business database is likely to use (a) Excel; (b) MS Word; (c) paper records; (d) a database management system; (e) none of these
3. \_\_\_\_ enable easy entry of data in professional DBMSs (a) spreadsheets; (b) text files; (c) tables; (d) forms; (e) queries
4. Data mining (a) designs databases; (b) analyzes large quantities of business data; (c) searches the Internet; (d) uses spreadsheets; (e) none of these

## **Objectives-related questions for topic 3 (database)**

### **3a. Basic database concepts**

1. What is a database?
2. Describe a database *table*.
3. What is the purpose of a *primary key*?
4. What do rows and columns in a database table represent?
5. What is a database query?
6. How is information integrity maintained in a database?
7. How are *attributes* and *records* represented in a database table?
8. Contrast selection queries with projection queries.
9. In database terminology, what is an Excel filter? Give an example.
10. Name a form of *metadata* in database management.
11. Give and motivate an alternative to Excel for handling business data.
12. How is non-duplication of data assured in database design?
13. What is an *entity* in database design?

### **3b. Design database**

Use entity-relationship notation (an ER diagram) to design a database to represent three entities as specified below. State the relationship. Give some attribute names for each entity; give primary keys.

1. Customers, products, and transaction detail
2. Courses, professors, sections
3. Job applicants and jobs, so that a sheet can be generated with information about all the new hires for a given period of time
4. Poems and journal issues, so that a sheet can be generated listing all the poems published for a given journal issue
5. Conference attendees and workshops at a research conference, so that a report can be generated listing all the attendees at a given workshop
6. Home buyers and open houses, so that a list can be generated of all the home buyers who visited a given home
7. Customers and CDs, so that a sales slip can be generated
8. CD vendors selling shipments of music to music stores, so that a vendor can list all the shipments made to a certain music store
9. Songs and albums so that lists of contents of each album can be created
10. Novels and literature courses, so that a list of novels can be created for each course
11. Radio stations and advertisers so that a list of advertisers can be generated for a station
12. Students and courses, so that a list of a students in each course can be generated
13. Give a case where a database table may represent a relationship between two entities.
14. How is a relationship between two entities implemented?

### **3c. Queries**

1. Describe how to select all records, in a database table such as in Excel, according to a search criterion such as the number of bedrooms in a house record.
2. What is a way in MS Excel to see only values that are within a certain range in a database table?
3. How would you retrieve all the real-estate listings in a database table where the price is in the range of \$200,000 to \$300,000?
4. How would you retrieve all the employee records in a database table where the town name starts with "F"?
5. With copies of the table in *listing.xls*, perform filter operations to
  - (a) select all listings for electric-heated homes in Framingham and Natick with 3 bedrooms or fewer;
  - (b) show how many homes there are with each number of bathrooms available;
  - (c) show average cost of Wellesley homes;
  - (d) show cost of the most expensive listing in Wayland
  - (e) select all listings for colonial-style homes in Framingham.

### **3d. Pivot table**

Create a pivot table to show the following, with reference to *listing.xls*:

1. the average costs of homes, by number of bedrooms and number of acres of land
2. the numbers of houses that are listed, by town and by heating type
3. the average costs of houses, by style and town
4. the correlation of heating type to home cost
5. correlation of the effect of the number of bedrooms and heating style on cost
6. average costs according to architectural style and number of bathrooms
7. minimum costs of houses by town and acreage
8. average cost of Wellesley homes
9. the effect of the number of bedrooms and bathrooms on maximum cost
10. the effect of number of bedrooms and bathrooms on maximum cost
11. the average costs of houses, by number of bedrooms and number of acres of land
12. show the numbers of houses that are listed, by town and heating type
13. the average costs of houses, by architectural style and town
14. the effect of the lot size and number of baths on minimum cost

## Study questions on topic 4 (Hardware)

### Multiple choice

#### 1. Introduction and motivation

1. An example of analog representation is (a) a file stored on a computer; (b) a message sent on the Internet; (c) the sound heard from an iPod; (d) a picture in RAM; (e) a register in a processor
2. Which is *not* hardware? (a) general-purpose computer; (b) operating system; (c) video game console; (d) printer; (e) all are hardware
3. A hard disk is (a) application software; (b) operating-system software; (c) hardware; (d) hardware and software; (e) none of these
4. A DVD player is (a) application software; (b) operating-system software; (c) hardware; (d) hardware and software; (e) none of these
5. RAM is (a) application software; (b) operating-system software; (c) hardware; (d) hardware and software; (e) none of these

#### 2. Digital representation of information

1. A bit's value (a) is 0 to 255; (b) is 0 or 1; (c) fills a register; (d) fills a memory cell; (e) corresponds to a color pixel
2. Of the following, the smallest is: (a) bit; (b) kilobyte; (c) megabyte; (d) byte; (e) word
3. All data is stored by computers in what form? (a) analog; (b) digital; (c) megabyte; (d) packet; (e) other

#### 3. The binary system of numerals

1. The binary system is appropriate for digital computers because (a) our hands have ten fingers; (b) binary arithmetic is simpler by nature; (c) binary may be easily translated to hexadecimal notation; (d) binary and decimal values are easily converted; (e) digital computers are based on two-state devices
2. (T-F) A yes-or-no answer to a question must be stored in at least three bytes of memory.  $3 = (a) 111_2; (b) 11_2; (c) 10_2; (d) 11000_2; (e) \text{none of these}$
3. Place values are used in (a) memory; (b) software design; (c) decimal numbers only; (d) binary, decimal, and hexadecimal numerals; (e) assembler programs
4. In the binary-to-decimal conversion presented, there is one step for each (a) value converted; (b) decimal digit; (c) binary digit; (d) remainder; (e) carry

#### 4. Digital computer architecture

1. The two standard ways to access data from storage include sequential and (a) binary; (b) wireless; (c) random; (d) arbitrary; (e) reverse.
2. Components of a CPU include (a) RAM; (b) control unit; (c) track; (d) packet; (e) software

3. Which type of language is closest to that used by a processor? (a) query; (b) formula; (c) markup; (d) assembler; (e) transfer-protocol
4. The fastest-accessible of the following is: (a) RAM; (b) hard disk; (c) cache; (d) register; (e) web site
5. What is fetched in the fetch-execute cycle? (a) instruction; (b) operand value; (c) record; (d) byte; (e) file
6. A NOT gate is a(n) (a) software building block; (b) hardware building block; (c) design tool; (d) algorithm; (e) Java operator
7. The OR gate (a) is a peripheral; (b) contains a register; (c) yields a 0 if both its inputs are 1; (d) yields a 0 unless both its inputs are 1; (e) produces a 1 if either of its inputs is 1
8. The AND gate (a) is a peripheral; (b) contains a register; (c) yields a 0 if both its inputs are 1; (d) yields a 0 unless both its inputs are 1; (e) produces a 1 if either of its inputs is 1
9. A one-input circuit that outputs a 1 on input of 0 and a 0 on input of 1 is (a) NOT; (b) OR; (c) AND; (d) MAYBE; (e) XOR
10. The kind of display on a laptop is (a) PDF; (b) CRT; (c) LCD; (d) ABC; (e) none of these
11. Which is *not* a peripheral? (a) the microprocessor; (b) the monitor; (c) the keyboard; (d) the printer; (e) a disk drive
12. Input/output is data that moves between RAM and (a) the program counter; (b) data registers; (c) the instruction register; (d) RAM; (e) peripherals
13. Electronic storage composed of silicon chips is (a) RAM; (b) CDROM; (c) hard disk; (d) keyboard; (e) monitor
14. Microprocessors have on them: (a) a disk; (b) a screen; (c) registers; (d) high-level code; (e) documentation
15. The characteristic feature of all general-purpose computers is that they (a) display colors; (b) have CDROMs; (c) can be upgraded; (d) can store programs; (e) run faster than 166 MHz.
16. (T-F) The fetch-execute cycle runs until the user inputs a Quit instruction.
17. A disk drive is a (a) software component; (b) register; (c) peripheral; (d) logic gate; (e) silicon-based storage device
18. (T-F) The operating system runs concurrently as applications execute.
19. Electronic storage composed of silicon chips is (a) RAM; (b) CDROM; (c) hard disk; (d) keyboard; (e) monitor
20. (T-F) The language of a microprocessor is expressed in 0's and 1's.
21. Which instruction below does *not* change the value in the accumulator? (a) *load*; (b) *store*; (c) *add*; (d) *sub*

22. A data statement in an assembler program introduces (a) a memory address by number; (b) a memory address using a name; (c) the accumulator; (d) the program counter; (e) a user-input value
23. (T-F) A microprocessor has its own special assembler language.
24. A language expressed in binary notation is (a) machine language; (b) assembler language; (c) Java; (d) all of the above; (e) none of the above
25. Assembler is (a) a language adapted both to the hardware and to human use; (b) an algorithm to convert numbers; (c) a high-level language; (d) a component of a microprocessor; (e) part of a network operating system
26. A mnemonic (a) specifies a data location; (b) specifies a data value; (c) specifies a constant; (d) specifies an action; (e) is a language
27. (T-F) The language of the microprocessor is assembler.
28. (T-F) At the processor level, a loop entails a backward jump.
29. Which type of language is closest to that used by a processor? (a) query; (b) formula; (c) markup; (d) assembler; (e) transfer-protocol

## Objectives-related questions for topic 4 (Hardware)

### Terms

For each of the terms below assigned to you, give a brief definition that relates the term to the course material.

- |                                   |                              |                          |                            |
|-----------------------------------|------------------------------|--------------------------|----------------------------|
| 1. address                        | 14. digitize                 | 27. integrated circuit   | 41. processor              |
| 2. analog data                    | 15. discrete value           | 28. kilobyte             | 42. program counter        |
| 3. arithmetic logic unit          | 16. DVD                      | 29. LCD                  | 43. RAM                    |
| 4. assembler language             | 17. embedded device          | 30. machine instruction  | 44. random access          |
| 5. binary numeral                 | 18. external storage         | 31. machine language     | 45. register               |
| 6. bit                            | 19. fetch-execute cycle      | 32. megabyte             | 46. representation of data |
| 7. bitmap                         | 20. file                     | 33. memory               | 47. ROM                    |
| 8. Boolean                        | 21. flash memory             | 34. microprocessor       | 48. sequential access      |
| 9. byte                           | 22. gate                     | 35. operand              | 49. storage                |
| 10. cache                         | 23. general-purpose computer | 36. parallel computation | 50. storage metaphor       |
| 11. CDROM                         | 24. gigabyte                 | 37. path name            | 51. stored-program device  |
| 12. central processing unit (CPU) | 25. hard disk                | 38. peripheral           | 52. word size              |
| 13. control unit                  | 26. input                    | 39. pixel                |                            |
|                                   |                              | 40. port                 |                            |

#### 4a. Terminology of computer hardware

1. What is a smaller unit of information than a byte?
2. What storage unit is used in all instances of information technology, and why?
3. Use the terms *processor*, *instruction*, *data*, *RAM*, *register*, and *I/O* in or more sentences that shows you understand the meanings of the terms.
4. Use the terms *accumulator*, *RAM*, *program counter*, *processor*, and *instruction register* in a sentence that shows you understand the meanings of the terms.
5. Contrast two or three categories of physical media or devices used in data storage.
6. Give an example of random access and an example of sequential access.
7. What two *kinds* of components does a port connect?
8. What are the smallest elements of a color image displayed on a monitor, and how are the colors represented?

#### 4b. The binary system of numerals

1. In what way is the binary system of numerals relevant to information technology?
2. What unit of storage is used in all instances of information technology, and why?
3. In what way can it be said that all information processed or communicated by information technology takes a common form?
4. In what way may it be said that a bit has no meaning, by itself?
5. Use an appropriate expression that gives the number of bits in a kilobyte.
6. Relate the following concepts: bits, characters, 32-bit words, bytes, registers, and megabytes.

7. Does a bit have an inherent meaning? Why/why not?
8. How can the binary system represent text?
9. How can the binary system represent sound?
10. How can the binary system represent images?

#### 4c. Digital computer architecture

1. In what part of an IT system is the *arithmetic logic unit* found and what else is found there?
2. Describe how a computer program executes at the hardware level.
3. Order the following according to distance from the processor control unit: cache, hard drive, RAM, program counter, accumulator.
4. What are some features of a machine language as opposed to a different kind of language?
5. Where is the program counter and what is its purpose?
6. Where is the instruction register, and what is its purpose?
7. Where is the accumulator and what is its purpose?
8. What does the assembler instruction *load* do?
9. What does the assembler instruction *store* do?
10. What does the assembler instruction *add* do?
11. What does the assembler instruction *sub* do?
12. What are some significant ways that processor-based systems as used in IT differ from living organisms?
13. How are variables represented in assembler language?
14. Describe the components of the code below and name its language.

```

load   x
add    x
store  y
add    y
store  z
print  z
stop
x data 0
y data 0
z data 0

```

#### 4d. Digital and analog information

What is the digital and analog data involved in

1. an inkjet printing process
2. a cell phone call
3. display of a video on a computer
4. measurement of time
5. measurement of distance
6. Give an example of storage of analog data digitally.
7. Give an example of converting digitally stored data to analog form.
8. Contrast digital and analog devices, giving one example of each.
9. Distinguish *analog* and *digital* data, with examples of each.

### Projects

1. Carry out these operations:
  - a. Check free disk space
  - b. Rename file
  - c. Sort directory by date, by file name
  - d. Control directory view to show file names and dates at left
  - e. create folder, move files to folder, move folder
  - f. Create shortcut
  - g. View print queue
2. Create folders in your network student account area for files associated with this course and other projects. Design a file organization for your materials. For example, you may wish to create folders within the course folder for each topic, or one folder for homework and one for the project, etc. Submit a screen shot of your student account file directory using Word or Paint.

3. Download the program *asm\_setup.exe* (see below) and use it to install the program *asm.exe* in your student account (see below). Run *asm.exe*, and use it to step through the program *xy.asm* (below, and available in Blackboard under Course Documents), choosing step mode. To open *xy.asm* within *asm.exe*, use File / Open.

```

input  x
load   x
add    x
add    x
store  y
print  y
stop
x data 0
y data 0

```

Test the program for two or more different input values.

- (a) From your observation, what occurs when the fifth line of the program, *store y*, executes?
- (b) Based on your observation, write a formula that accurately describes the relationship between input and output of program *xy.asm*. (Your formula could be of the form “Output is *n* larger than input,” or “Output is random,” or “Output is same as input.”)
- (c) Suggest a name for the program that describes what it does better than the name *xy.asm*, and better names for the data labels *x* and *y*.
- (d) Using a text editor such as Notepad, copy into your homework file a listing of *xy.asm*, the program, and *xy.out*, the record of your test of the program. The file *xy.out* is created when *asm.exe* runs *xy.asm*. (Optional: add a comment with your answer to (b) and rename the program and variables per (c).)

Describe in your own words the process of executing a program at the hardware level, referring to the processor, machine language, bits, registers, RAM, and I/O.

# Study questions on topic 5 (Networked computing)

## Multiple choice

### 1. Networked computing

1. Ethernet (a) is wireless networking; (b) involves shared use of a bus for all data communicated; (c) the Internet Protocol; (d) a form of hypertext; (e) none of these
2. Data is always transferred on the Internet in the form of (a) packets; (b) kilobytes; (c) files; (d) folders; (e) queries
3. Packets are created and routed according to the standards of (a) Windows; (b) Intel; (c) the Internet and Transfer Control Protocols; (d) Internet Service Providers; (e) none of these
4. A network (a) is a hierarchy of computers; (b) is any group of computers on the same wireless access point; (c) is a set of computers communicating; (d) requires a central management structure; (e) none of these
5. Any set of computers communicating among themselves is a(n) (a) tree; (b) Internet; (c) network; (d) hierarchy; (e) none of these
6. Networking requires (a) communication standards; (b) a centralized structure; (c) wires; (d) use of the same kind of computer; (e) none of these
7. Bandwidth is (a) storage capacity; (b) processing speed; (c) data capacity of a communication channel; (d) size of a network cable; (e) none of these
8. Networking is an example of (a) centralized computing; (b) distributed computing; (c) Internet computing; (d) standalone processing; (e) none of these
9. A server is (a) any network node; (b) a piece of hardware that channels data among computers; (c) a computer that responds to requests for data on a network; (d) a piece of software that runs on all Internet-connected machines; (e) none of these
10. Peer-to-peer networks contain (a) many servers; (b) many workstations; (c) three computers; (d) two computers; (e) low-ranked users
11. Intranets are (a) public Wi-Fi; (b) public and cable-connected; (c) private using Internet connections; (d) private using private connections; (e) none of these

### 2. Supporting technologies

1. The fastest medium in a-e is (a) coaxial cable; (b) dial-up; (c) fiber optic; (d) wireless; (e) satellite connection
2. The fastest medium in a-e is (a) coaxial cable; (b) dial-up; (c) fiber optic; (d) wireless; (e) satellite connection
3. A router may transfer data between (a) computers in a LAN; (b) networks; (c) a network and an external line; (d) components of a PC; (e) none of these
4. Wireless workstations transfer data to routers through (a) fiber-optic cable; (b) coaxial cable; (c) phone line; (d) access points; (e) the Internet

5. The shape and layout of a network is its (a) protocol; (b) geography; (c) topology; (d) taxonomy; (e) routing
6. The OSI seven-layer standard defines guidelines for (a) network topologies; (b) file formats; (c) HTML; (d) network protocols; (e) hardware components
7. Network adapters (a) carry data between workstations; (b) translate files between different formats; (c) assemble data into packets; (d) adapt networks; (e) adapt users to networking
8. A RFID tag contains (a) a router; (b) a workstation; (c) an antenna; (d) application software; (e) an LED
9. In a user PC on the FSC network, the "Y: drive" is (a) a processor; (b) a physical device; (c) a folder on the user computer's hard drive; (d) located on the server; (e) none of these

### 3. Network security and legal issues

1. Botnets are (a) viruses; (b) Trojan horses; (c) spam messages; (d) groups of computers controlled remotely without owners' permission; (e) none of these
2. A firewall blocks (a) all access; (b) spam; (c) phishing; (d) outside access to computers via the Internet; (e) none of these
3. Availability, integrity, authentication, confidentiality, and nonrepudiation are principles of (a) system use; (b) network infrastructure; (c) IT security; (d) software design; (e) database management
4. Network administrators (a) design software; (b) manage databases; (c) plan, install, and manage networks; (d) plan and design web sites; (e) help users to learn applications
5. Authentication, access privileges, and firewalls help provide (a) reliability; (b) speed; (c) connectivity; (d) security; (e) storage space
6. Encryption (a) enables authentication of user ID; (b) examines packets to block unauthorized access; (c) scrambles data to be unreadable without a special key; (d) requires special hardware; (e) none of these
7. Secure web sites are (a) firewall protected; (b) password protected or encrypted; (c) government protected; (d) accessible via special hardware; (e) none of these
8. Authentication assures that (a) a computer is safe to use; (b) a website is safe; (c) only users with permission gain access; (d) facts at a website are correct; (e) none of these
9. Examining packets to block unauthorized outside access to a computer is done by (a) the user; (b) the network administrator; (c) a firewall; (d) encryption; (e) none of these
10. Email is (a) totally private; (b) protected from employers' eyes; (c) accessible by employers; (d) accessible by any police officer; (e) none of these

#### 4. The Internet and the World Wide Web

1. A protocol is (a) a data item; (b) a server; (c) a program; (d) a set of communication rules; (e) none of these
2. A number used to identify a device on the Internet is (a) an IP address; (b) a URL; (c) a formula; (d) a protocol; (e) none of these
3. Which of these is not a way to extend HTML? (a) XML; (b) CGI scripts; (c) JavaScript; (d) machine code; (e) all are ways to extend HTML
4. An IP address (a) is an email address; (b) is a URL; (c) contains a domain name; (d) has 32 bits; (e) has 4 bits
5. The Internet's infrastructure is governed by (a) the government; (b) one corporation; (c) a set of boards and consortiums; (d) no one; (e) all the users
6. Protocols that enable communication, correcting for possible interruption of direct connections, use (a) circuit switching; (b) packet switching; (c) standard file formats; (d) broadband; (e) firewalls
7. Web scripts run on the \_\_\_\_\_ side (a) server; (b) client; (c) user; (d) Internet; (e) none of these
8. The Hypertext Transfer Protocol is used in (a) any asynchronous communication (b) clicking links; (c) packet formation; (d) database querying on a single workstation; (e) email exchanges
9. The Internet is (a) a company; (b) a centralized unit; (c) a network of networks; (d) an idea; (e) a methodology
10. The Internet originated to address \_\_\_\_\_ problems (a) military; (b) sports; (c) business; (d) revenue; (e) none of these
11. The Internet originated in (a) the 19<sup>th</sup> century; (b) the 20s or 30s; (c) the 40s or 50s; (d) the 60s or 70s; (e) the 80s or 90s
12. The founding ideas of the Internet were (a) analog transmission and hierarchical control; (b) packet transmission and decentralized control; (c) analog transmission and decentralized control; (d) packet transmission and hierarchical control; (e) none of these
13. Visiting a web site is a case of (a) client/server computing; (b) FTP; (c) database design; (d) machine language; (e) procedural language
14. HTTP is (a) a protocol; (b) a programming language; (c) an ISP; (d) a server; (e) none of these
15. The text that will display in the user's web browser is in which section of an HTML file? (a) <head>; (b) <html>; (c) <style>; (d) <body>; (e) none of these
16. Absolute and relative references are found in (a) PowerPoint slides and Word files; (b) logic gates and assembler code; (c) hyperlinks and spreadsheet formulas; (d) pivot tables and filters; (e) all of these
17. When a hyperlink is clicked (a) the user obtains exclusive use of the web server linked to; (b) the browser searches the Internet for the web page referenced; (c) the browser downloads the Internet file referenced by the hyperlink; (d) a search engine goes into action; (e) none of these
18. Which of the following is invoked when you type a query in Google? (a) a web crawler; (b) Internet Explorer; (c) a search engine; (d) a browser function; (e) none of these
19. Which of the following is not primarily designed to support interoperability: (a) HTML; (b) XLS; (c) CGI; (d) XML; (e) all are primarily designed for that
20. Social networks, blogs, and wikis are considered to be instances of (a) the Internet Protocol; (b) the Hypertext Transfer Protocol; (c) Web 2.0; (d) a standard established in 1990; (e) none of these
21. Web browsers may run \_\_\_\_\_ in languages other than HTML (a) macros; (b) formulas; (c) scripts; (d) Windows apps; (e) none of these

#### 5. The Internet and business

1. System integration (a) connects users for job networking; (b) involves data sharing in a large organization; (c) is not part of enterprise computing; (d) is the purpose of most database queries; (e) none of these
2. Commercial web-based email stores email on (a) the user's machine; (b) a local network server; (c) the provider's server; (d) a publicly accessible web site; (e) none of these
3. Store-and-forward email (a) is downloaded for storage on user's machine; (b) is a service for those without computers; (c) is an anonymity service; (d) is uploaded for storage on the server; (e) none of these
4. RAID assures (a) freedom from spam; (b) security; (c) fault-tolerant storage; (d) government access to private data; (e) private access to government data
5. Enterprise computing (a) serves the CEO; (b) serves hundreds or thousands of users; (c) is the same as E commerce; (d) is small-scale; (e) none of these
6. An example of the need for *serializing* transactions is (a) retail record keeping; (b) deciding business priorities; (c) concurrent attempts to withdraw from the same bank account; (d) keeping a chronological blog; (e) none of these
7. B2B is a (a) model of E commerce; (b) protocol; (c) supervising body of the Internet; (d) Web 2.0 service; (e) storage technology
8. Which is *not* a major information systems job category? (a) network administrator; (b) protocol writer; (c) database administrator; (d) web server administrator; (e) telcom technician

## **Objectives-related questions for topic 5 (Networking)**

### **Terminology**

- |                            |                       |                           |                            |
|----------------------------|-----------------------|---------------------------|----------------------------|
| 1. asynchrony              | 13. download          | 26. network administrator | 39. synchrony              |
| 2. atomic transaction      | 14. firewall          | 27. network medium        | 40. TCP/IP                 |
| 3. authentication          | 15. HTML              | 28. packet                | 41. topology               |
| 4. bandwidth               | 16. HTTP              | 29. pathname              | 42. transaction processing |
| 5. browser                 | 17. hyperlink         | 30. protocol              | 43. upload                 |
| 6. client                  | 18. Internet          | 31. query processor       | 44. URL                    |
| 7. client/server computing | 19. Internet Protocol | 32. router                | 45. Web 2.0                |
| 8. crawler                 | 20. Internet security | 33. script                | 46. web page               |
| 9. data compression        | 21. interoperability  | 34. search engine         | 47. web service            |
| 10. data integrity         | 22. IP address        | 35. security              | 48. Wi-Fi                  |
| 11. distributed computing  | 23. ISP               | 36. server                | 49. wiki                   |
| 12. domain name            | 24. LAN               | 37. social network        | 50. World Wide Web         |
|                            | 25. network           | 38. spyware               |                            |

### **5a. Networked computing and the Internet**

1. What are packets and how are they used?
2. What is the relationship between *distributed* and *client/server* computing?
3. What is *bandwidth* and in what units is it measured?
4. Place the following eras of connectivity in chronological order: networked, centralized, distributed.
5. What does LAN networking have that peer-to-peer does not?
6. What is a network?
7. What kinds of network exist?
8. What is a server?
9. How are *networks*, *servers*, and *packets*, related?
10. What is required for computers to communicate and work together?
11. What is a LAN?
12. Distinguish synchronous from asynchronous communication, with examples.
13. What is Ethernet?
14. What is a protocol?
15. What is a network topology?
16. Describe some advantages and inconveniences of networked computing as opposed to the use of stand-alone workstations.
17. Describe synchronous and asynchronous cases of:
  - phone communication
  - IM
  - email
18. What are factors that determine bandwidths of different media of communication?
19. Where might middleware be used to support networked computing that you do?

### **5b. Local and remote storage**

1. Just after you send an email, where does your message reside, physically?
2. Just after you send an email, where does your message reside, physically?

3. What does the client communicate to a web server, and what does the server communicate to the client?
4. Distinguish the physical location of the data on your C: drive from the physical location of the data in your FSC student account.
5. Data at a certain “drive” icon on your laptop is also accessible from FSU lab machines. Explain why.
6. What are the names of computers that store data accessible from many places, and computers that request such data?
7. What is client/server computing?
8. If your Internet connection is broken, a web page may remain displayed. Why?
9. Distinguish locally stored data from remotely stored data.
10. Where does an HTML file reside physically, (a) as you click a link; (b) while the page displays on your browser?

### **5c. Network security and legal issues**

1. What is authentication used for?
2. What do firewalls do?
3. How is outside access to networked computers blocked?
4. What utility filters incoming packets, and for what purpose?
5. What are some forms of malware?
6. How is a secure web site protected?
7. Explain two technical means by which secure communication of data is assured.
8. What is encryption for?
9. When may the government or an employer look at private emails?
10. What are some principles of IT security?
11. Is it ethical to connect to an unknown, unsecured, wireless network? Give *technical* reasons for your answer.
12. Is file sharing more of an ethical and legal issue today than copyright infringement of media was twenty years ago? Why or why not?

### **5g. The Internet**

1. Give two well-known transfer protocols, by initial and name.

2. Use the terms *packet*, *URL*, and *IP address* in a sentence so that it is clear that you understand them.
3. What Internet-related protocols form packets and enable communication of web pages?
4. What are packets and how are they used?
5. What are the purpose and form of an IP address?
6. What is a domain name?
7. What is an ISP?
8. Name advantages and disadvantages of the use of email attachments.
9. What must be assured in electronic transaction processing?
10. What is a web server?
11. Distinguish a web server from a web site.
12. Distinguish a domain name from a URL.
13. Distinguish the World Wide Web from the Internet.
14. In what language are web pages communicated to the browser?
15. What interactions occur on the Internet, out of the user's view, when a URL is invoked by a user?
16. Name and describe the language in which web pages are communicated to the browser.
17. Name and describe the language used normally to format web pages.
18. In using web-based information for an academic research paper, what are some concerns researchers should have?
19. What is a nonlinear feature of web pages?
20. What are two ways to use a URL to visit a web site?
21. Describe what happens, out of your sight, when you submit a query to a web search engine.
22. What are the components of a URL?
23. Distinguish a URL from an IP address.
24. Distinguish distributed computing, client/server computing, and Web surfing.
25. Name two kinds of information that must be specified to create a hyperlink, and tell what a hyperlink is used for.
26. What data does a hyperlink contain?
27. Why are all HTML files readable in Notepad?
28. What are HTML tags and what are they used for? Give examples.
29. What is an HTML comment?
30. What do fiber optic, coaxial cable, phone lines, and the air have in common?
31. In what sense is a transaction atomic?
32. Why must some transactions be serializable?
33. What is the common term for web shopping, point of sale transactions, B2B commerce, and network-enabled staff meetings?
34. Give two meanings for the word "client" in the context of E business.
35. Give a disadvantage of E commerce.
36. Why would or would not enterprise computing be appropriate for a family-owned shop at a mall?
37. Describe two job categories in information systems.
38. Describe some features of E commerce that differ from traditional commerce.
39. Why would a wholesale supplier wish to create an HTML file?

### ***Longer answer***

1. Describe your network account: How you use it and how its data is organized.
2. Post a clipping from the Web that refers to *networked computing* in one paragraph or more. Comment briefly on it in relation to the course material.
3. What transactions recorded by networked computers have you carried out today?
4. On your laptop, run *Spybot Search & Destroy*, which has been recommended by FSC Information Technology Services. Post a screen view of the report given.
5. Design a LAN to connect your dorm computers ... "describe the number, type, and location of the computers that will form your network ... what type of network technology you want to use ... Create a shopping list of the network components you need to purchase, and then use the Web to locate prices for each item on your list" giving URLs for sites used." (Parsons-Oja, p. 292)
6. Ping Google from your desktop, a home machine, and a wireless laptop, recording results. (To Ping, go to *Programs/Accessories/Command Prompt*, or *Programs/Run/cmd*. On the black-background window, type *ping google.com*.)
7. "Suppose that you are organizing a high school debate about global communications technology... devise a controversial question on which the debate will be based. ... write 'pro' and 'con' paragraphs." (Parsons-Oja). Give sources you find to help support debate. *Ideas*: global access to Internet; World Bank; sharing of information; access to news reports; the Digital Divide; privacy; intellectual property; protection of children; free expression. (Relate any of these issues to concepts discussed in slides on Topic 5.)
8. *Issue*: Examine one or more aspects of the free wireless-LAN controversy, consulting e.g. the Free WLAN InfoWeb, [www.course.com/np/concepts9/ch05](http://www.course.com/np/concepts9/ch05) (you must register there to access this text).
9. "Identify a topic you'd like to learn about [on networking], write a brief description of your topic, why it interests you, and what you would like to learn about it... use a search engine ... to locate online tutorials about your topic.... provide URLs." Provide identifying info about these sources. (P-O, 9ed., p. 293).
10. List a few qualifications and skills you'll need for your possible ideal job and explore the Internet for resources to help obtain those skills, listing at least two URLs related to this. (See Parsons-Oja 9ed, p. 292, "Resume Builder.")
11. Describe some features of E commerce that differ from those of traditional commerce.

12. Upload an HTML file, under the name `index.htm`, and your picture file, to the FSC server, following instructions on the handout, "How to create and upload HTML files at FSC." Send instructor a link to that location, via email or Digital Dropbox.
13. What information other than a URL would a reader of your research results want to have if the reader were interested in evaluating your research?
14. Upload an HTML file, under the name `index.htm`, to the FSC server, following instructions on the handout, "How to create and upload HTML files at FSC." Post a link to that location.
15. *Critical Thinking*: "How do you use the Internet? What advantages does it provide for you? What are your pet peeves about the Internet as it currently works ...? What would be your ideal Internet?" (Parsons-Oja, 9ed, p. 292)

## Study questions on topic 6 (Problem solving and programming)

### Multiple choice

#### 1. Specification and object-oriented design

1. One language used especially for design of interactive systems is (a) HTML; (b) machine language; (c) database query language; (d) UML; (e) none of these
2. (T-F) The problem-solving process presented in class places design before coding.
3. Object-oriented design focuses problem solving on (a) categories of things; (b) processes; (c) methods; (d) integers
4. A data item that is defined in terms of properties and operations is (a) simple; (b) a bit; (c) input; (d) an object; (e) binary
5. In event-driven programming, an event is usually (a) input; (b) output; (c) a sequence structure; (d) a program decision; (e) something that happens during web-site development
6. Modular decomposition of processes is most closely associated with which kind of design? (a) web-site formatting; (b) spreadsheet; (c) database; (d) algorithm; (e) none of these

#### 2. Algorithm design tools

1. Which is *not* a feature of algorithms? (a) precision; (b) finiteness of time; (c) step-by-step sequencing; (d) limited set of possible inputs; (e) definiteness of result
2. Which is *not* a way to express an algorithm? (a) HTML; (b) JavaScript; (c) flowchart; (d) pseudocode; (e) machine code
3. Algorithms are always (a) efficient; (b) executed in finite time; (c) languages; (d) a kind of program; (e) none of these
4. Design tools include (a) output; (b) flowcharts; (c) registers; (d) queries; (e) none of these
5. The branch is a (a) language; (b) control structure; (c) data structure; (d) program; (e) none of these
6. Control structures are used in (a) design; (b) output; (c) input; (d) formatting; (e) none of these
7. Successively more detailed development of an algorithm is called (a) object-oriented design; (b) a module hierarchy; (c) bottom-up design; (d) stepwise refinement; (e) problem specification
8. Multiple alternatives (a) are not supported by standard programming; (b) call for use of modules; (c) require multiple diamonds in a flowchart; (d) require repetition; (e) none of these

9. When a problem is complex, the complexity can often be conquered in the design stage by (a) brute force; (b) documentation; (c) modular decomposition; (d) input/output; (e) logic gates
10. (T-F) A branch may be nested inside a loop.
11. (T-F) A component of a structured flowchart has one entrance and one exit.
12. (T-F) The loop is a data structure.
13. (T-F) Structured programming and modular programming are roughly synonyms.
14. (T-F) A flowchart using only three different control structures can diagram a solution to any solvable problem.
15. Pseudocode (a) has a precise syntax; (b) is a false solution; (c) is a low-level language; (d) is an informal notation; (e) none of these
16. Which is *not* a recommended tool for program design? (a) flowcharts; (b) pseudocode; (c) object-oriented analysis; (d) hierarchy charts; (e) use of keywords
17. Which is *not* a control structure? (a) sequence; (b) branch; (c) loop; (d) a file; (e) all are control structures
18. (T-F) Syntax is a major factor in program design.
19. Modular decomposition of processes is most closely associated with which kind of design? (a) web-site formatting; (b) spreadsheet; (c) database; (d) algorithm; (e) none of these
20. Which is *not* a feature of algorithms? (a) precision; (b) finiteness of time; (c) step-by-step sequencing; (d) limited set of possible inputs; (e) definiteness of result

#### 3. The loop control structure

1. Which of these is a control structure? (a) hyperlink; (b) Excel worksheet; (c) database table; (d) loop; (e) register
2. The loop is a (a) language; (b) control structure; (c) data structure; (d) program; (e) none of these
3. Which of these is a control structure? (a) hyperlink; (b) Excel worksheet; (c) database table; (d) loop; (e) register
4. (T-F) The loop is a control structure.
5. (T-F) The body of a top-tested loop will always execute at least once.
6. A trace of an algorithm provides (a) input; (b) a list of errors; (c) snapshots of the state of the algorithm over time; (d) a view of a table; (e) none of these

#### 4. Event-driven software and JavaScript

1. In event-driven programming, an event is normally (a) input; (b) output; (c) a sequence structure; (d) a program decision; (e) something that happens during web-site development
2. An event handler is (a) a program; (b) program code; (c) a browser; (d) a job category; (e) none of these
3. HTML is mainly a(n) \_\_\_\_\_ notation (a) procedural; (b) formatting; (c) algorithmic; (d) interactive; (e) none of these
4. HTML supports interaction via (a) tags; (b) extensions such as JavaScript; (c) methods; (d) user commands; (e) none of these
5. JavaScript encodes (a) web-page formatting; (b) responses to input events; (c) database design; (d) statistical analysis; (e) none of these
6. JavaScript code is likely to appear in (a) spreadsheet formulas; (b) processor registers; (c) database queries; (d) HTML files; (e) none of these
7. Variables may be assigned values in (a) JavaScript statements; (b) spreadsheet formulas; (c) named styles; (d) packet transmission; (e) none of these
8. Of the following, which is a high level programming language? (a) assembler; (b) HTML; (c) machine; (d) JavaScript; (e) none of these
9. In JavaScript, “+” signifies (a) addition; (b) concatenation; (c) addition and concatenation; (d) any operation; (e) none of these
10. *parseInt* (a) is a variable; (b) converts strings to integers; (c) converts numbers to strings; (d) is a language; (e) none of these
11. A JavaScript *assignment statement* can change (a) the current URL; (b) a variable’s value; (c) a variable’s name; (d) user ID; (e) none of these
12. To use a JavaScript variable, syntax requires it to be (a) requested; (b) initialized; (c) promulgated; (d) declared; (e) none of these
13. JavaScript encodes (a) web-page formatting; (b) responses to input events; (c) database design; (d) statistical analysis; (e) none of these
14. JavaScript is a \_\_\_\_\_ language (a) markup; (b) procedural; (c) functional; (d) machine; (e) none of these
15. *alert* is a(n) (a) JavaScript method; (b) HTML event; (c) HTML tag; (d) user warning; (e) none of these
16. “Interface” refers most generally to how an application (a) sends data; (b) responds to the user; (c) retrieves data from the server; (d) sends data to server; (e) none of these
17. Implementation is (a) interface; (b) design; (c) coding; (d) analysis; (e) none of these
18. A window is a(n) (a) method; (b) class; (c) object; (d) operation; (e) none of these

### Objectives-related questions on topic 6 (problem solving and programming)

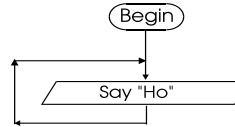
#### 6a. System development

1. In the systems development life cycle, what steps follow analysis?
2. Distinguish problem specification, system design, and program coding.
3. In software development, what steps are recommended before coding?
4. Name two well-known tools used for writing down a program design before coding.
5. What kind of programming stresses use of three control structures and modular decomposition?
6. What kind of programming stresses defining categories of things and their behaviors?
7. Describe the steps that precede coding, in the system development life cycle.
8. Distinguish problem specification, system design, and program coding.
9. In the software development process, what steps are recommended before coding a program? After coding?
10. What are some aspects of a system that a system requestor or specifier must consider?

#### 6b. Algorithms

1. What is an algorithm?
2. Put each of the following into one of the shapes (rectangle, parallelogram, or diamond):
  - (a)  $\text{count} < 5$ ;
  - (b) display total;
  - (c)  $\text{total} \leftarrow \text{total} + x$ .
3. What are two notations in which to express an algorithm?
4. What kind of structures are the sequence, branch, and loop, and what algorithms can they be used to specify?
5. What are the three standard control structures, sufficient to specify any algorithm?
6. A precise plan to solve a problem in finite time is \_\_\_\_
7. The word *otherwise* might be appropriate in pseudocode for which control structure?
8. What is the computer-science term for a precise plan to solve a problem in a finite amount of time?
9. What is pseudocode?
10. What is an algorithm?
11. Put each of the following into one of the shapes below (rectangle, parallelogram, or diamond): (a)  $\text{count} < 5$ ; (b) display total; (c)  $\text{total} \leftarrow \text{total} + x$ .
12. What are two ways to express an algorithm?
13. What kind of structures are the sequence, branch, and loop, and what algorithms can they be used to specify?
14. What are the three standard control structures, sufficient to specify any algorithm?
15. How is " $\text{total} \leftarrow \text{total} + x$ " similar to and unlike an algebraic equation?

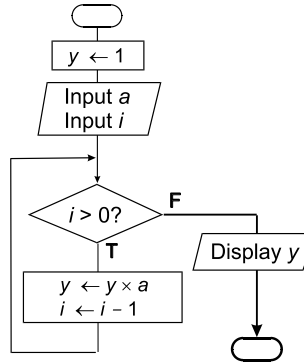
1. The word *repeat* might be appropriate in pseudocode for which control structure?
2. Counting from 5 to 15 would require which control structure?
3. Does the flowchart below diagram an algorithm? Explain.



4. Give an example of an object that is found on the screen in the Windows or OS/2 user environment. What are some of its data attributes? Its behaviors?
5. How many times will a counter-controlled loop iterate? A sentinel-controlled loop?
6. Name two variants of the loop control structure.

#### 6c. Tracing an algorithm

1. Consider this flowchart.

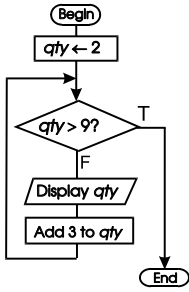


Use the table below to trace the algorithm specified in the flowchart, for inputs *a* and *b* of

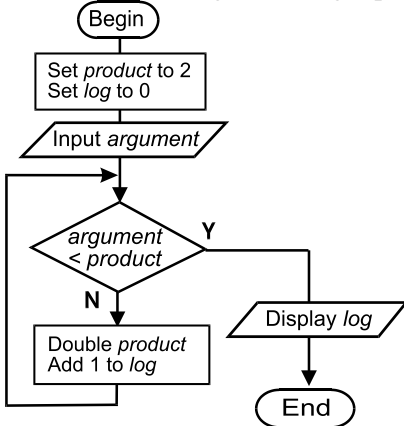
- (a) 2 and 3;
- (b) 4 and 2;
- (c) 5 and 1;
- (d) 10 and 3;
- (e) 12 and 2;
- (f) 1 and 5;
- (g) 2 and 4
- (h) 5 and 3;
- (i) 3 and 2.

<i>a</i>	<i>i</i>	<i>y</i>	output
_____	_____	_____	_____
_____	_____	_____	_____
_____	_____	_____	_____
_____	_____	_____	_____
_____	_____	_____	_____

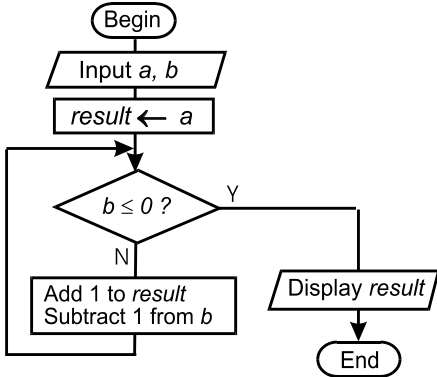
2. Trace the flowchart below.



3. Trace the following, assuming input of 12.



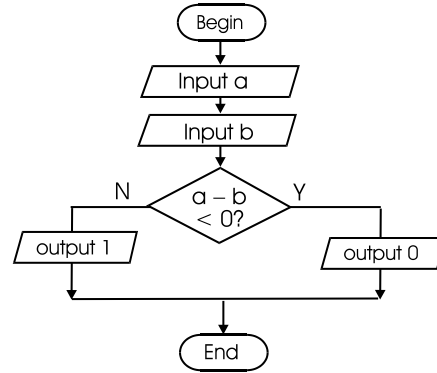
4. Consider the flowchart below.



For each of the input pairs (a, b), shown below, show the resulting output:

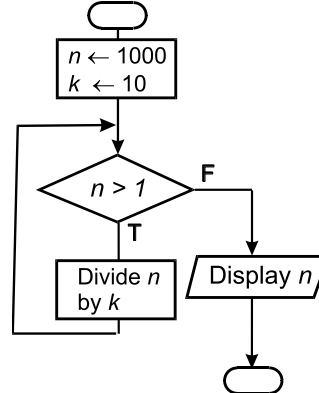
	<b>Input a</b>	<b>Input b</b>	<b>Output</b>
(a)	2	1	_____
(b)	1	3	_____
(c)	4	2	_____
(d)	7	10	_____
(e)	3	2	_____
(f)	3	5	_____
(g)	6	2	_____

5.

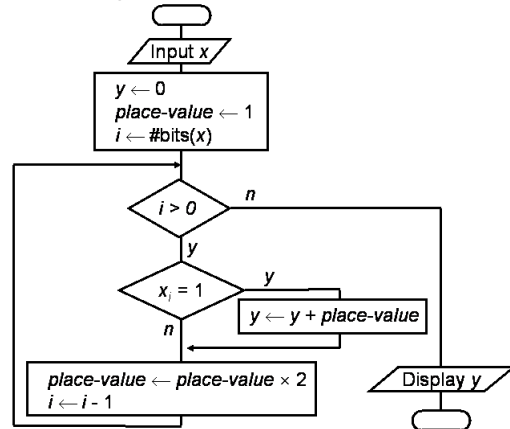


Informally, what does the output of this algorithm tell about the two inputs?

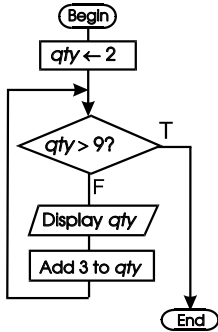
6. Trace the flowchart below.



7. Show a trace of this flowchart, for inputs (a) 11011; (b) 101101; (c) 101010; (d) 011001; (e) 010110; (f) 100101; (g) 100111



8. Show a trace of this flowchart:



## 6d. Flowchart or pseudocode

Using flowchart or pseudocode, design an algorithm or interactive process that

- inputs twenty numbers and displays their average.
- loops to accept four numbers and displays their sum
- accepts two numbers and displays the larger.
- accepts three numbers and displays the largest
- accepts four numbers and displays the largest
- accepts five numbers and displays the largest
- prompts for two integers and displays their quotient, using only subtraction; show an error message if the divisor is 0.
- accepts a number  $x$  and displays the sum of all the whole numbers from 1 to  $x$
- accepts a number  $x$  and displays the product of all the whole numbers from 1 to  $x$
- prompts for two integers and displays their product, using only addition and subtraction operations in your calculations
- prompts for a string and tells whether it contains any doubled-up characters.
- loops to accept four numbers and displays their sum
- prompts for an input value and outputs the integer part of its base-2 logarithm, i.e., the number of times the number can be divided by two before reaching a value less than one.
- prompts for  $a$  and  $b$ , loops to output  $a^b$
- accepts a number  $x$  and displays the sum of all the whole numbers from 1 to  $x$
- accepts numbers  $a$ ,  $b$  and displays the product of all the whole numbers from  $a$  to  $b$
- prompts for an input and outputs its factorial, where factorial  $(n) = n \times (n - 1) \times (n - 2) \times \dots \times 1$  (for input of 4, output  $4 \times 3 \times 2 = 24$ )
- inputs integer  $x$  and uses a loop to generate the largest power of 2 less than  $x$  (Examples: for  $x=12$ , output 8, for  $x=25$ , output 16)
- inputs  $x$  and tells whether  $x$  is a prime number (is divisible by any number other than itself and 1)
- inputs  $x$  and outputs the largest number lower than  $x$  that divides  $x$  without a remainder (Examples: for input of 9, output 3; for input of 10, output 5)

- inputs a number,  $n$ , then inputs  $n$  values and displays their sum
- inputs dollar amount  $x$  and outputs the value of an investment of  $x$  at 4% per year for three years
- inputs a number,  $n$ , then prompts for that many values and displays the sum of those inputs.

## 6f. Debugging

- What is debugging?
- What is the name for fixing system faults? Explain this skill.
- When and how does debugging occur?

## JavaScript and event-driven software

- What is an event handler and where is it used?
- Contrast machine language to JavaScript.
- Contrast event-driven to command-driven software.
- Give an example of an *event* and relate this to Javascript and HTML.
- How are JavaScript and HTML used together and what is the role of each?
- Describe how JavaScript and HTML may be used in the same web-resident file.
- What does the following JavaScript code do?
  - var a, b, total
  - $x = \text{parseInt}(\text{prompt}(\text{"Enter your age"}, \text{""}))$
  - $\text{alert}(\text{"Your age is " + } x)$
- Describe two meanings of "+" in JavaScript.
- Write a JavaScript statement that displays a rectangle with the word "Goodbye" in it and an "OK" button.
- Compare the languages of expressions used in Excel formulas and JavaScript code.
- In the code below, circle:
  - event-handling code
  - a tag that gives attributes of an input object and *describe* what these do or the kind of programming they represent

```

<html> <! double-num.htm>
<head><title>Input doubler</title></head>
<body>
  <script language= "JavaScript">
    var x;
  </script>
  <form name="Input"><table>
    <! Display prompt and get input:>
    <td>Enter a number:
      <! Generate input-box:>
      <input type=text name=x
        value="0" size= 6>
    </td>
    <! Wait for button-press and
      display message:>
    <td><input type=button value="Done"
      onClick = 'alert("Doubled: " +
        2 * parseInt(x.value))'>
    </td>
  </table></form>
</body>
</html>
  
```

12. See example file *count-yes.htm*. Modify it to create a page that works as follows:  
Four buttons are displayed: “\$1”, “\$5”, “\$10”, “Done”.  
The user presses the 1, 5, and 10 buttons each a certain number of times, to request these amounts. After pressing “Done,” user sees a number reflecting total amount requested. To solve this problem, you need to use an expression that assigns to *OnClick* a string that starts with 'alert(', ends with ')', and contains an expression that computes the sum of the \$1 amounts, \$5 amounts, and \$10 amounts.
13. Write and test programs in JavaScript whose inputs and outputs are as specified below. The program should be embedded in an HTML driver. Be sure to comment the program thoroughly, including the name of the program (HTML file name), your name, the date, and assignment number.
- | <i>input</i>                 | <i>output</i>  |
|------------------------------|----------------|
| (a) two numbers              | their sum      |
| (b) one number, $x$          | $x^3$          |
| (c) two numbers, $a$ and $b$ | $a^2 + b$      |
| (d) two numbers              | their product  |
| (e) two numbers              | their quotient |
14. Are infinite loops desirable? Why or why not?
15. In what activities is debugging used and what is its purpose?
16. Can testing a program to see its output help identify syntax errors? Why/why not?
17. Compare IF as used in Excel and in JavaScript.
18. Contrast HTML to JavaScript.
19. How is JavaScript used, with reference to HTML?

# Study questions on topic 7 (IT and society)

## Multiple choice

### 1. The networked society

1. A major technical factor in raising ethical and legal issues is (a) malleability of information; (b) accuracy of processing; (c) hard-disk speed; (d) interoperability; (e) none of these
2. Information technology raises ethical and legal issues due to the (a) unreliability of communication; (b) accuracy of processing; (c) opportunities for anonymity; (d) interoperability; (e) none of these
3. A major technical factor in raising ethical and legal issues is (a) unreliability of communication; (b) accuracy of processing; (c) hard-disk speed; (d) the low cost of copying electronic data; (e) none of these
4. Information technology raises ethical and legal issues due to the (a) unreliability of communication; (b) high expense of communication; (c) high speed of hard disks; (d) low expense of copying; (e) none of these
5. Which is *not* considered a reason why the Internet creates new ethical challenges? (a) speed of communication; (b) interactiveness; (c) people do harmful things; (d) easy reproducibility of information; (e) none of these
6. Anonymity \_\_\_\_\_ on the Internet (a) is enabled in new ways; (b) does not exist; (c) is universal; (d) is considered unethical; (e) none of these
7. The informational mode of development is distinguished by (a) exclusion of humans; (b) application of knowledge to knowledge; (c) machine intelligence; (d) economic growth; (e) none of these
8. The information-technology revolution is said to have taken place as part of a (a) collapse of capitalism; (b) restructuring of capitalism; (c) rise of statism; (d) cultural blossoming; (e) breakthrough in scientific thinking
9. It is said that societies are associated most closely with relationships of (a) technology; (b) ethics; (c) philosophy; (d) culture; (e) production and power
10. Capitalism is driven by maximization of (a) technology; (b) production; (c) profit; (d) culture; (e) conflict
11. The history of IT includes (a) steel mills; (b) coal mines; (c) census tabulation; (d) astronomy; (e) none of these
12. Network communication is characterized by (a) limited scope; (b) easy identification of all communicators; (c) reproducibility of information; (d) only one-to-one interaction; (e) none of these
13. A new feature introduced by “Web 2.0” is (a) hyperlinking; (b) social networking; (c) downloading; (d) E business; (e) none of these
14. A new feature introduced by “Web 2.0” is (a) hyperlinking; (b) wikis; (c) downloading; (d) E business; (e) none of these

### 2. Privacy and security

1. Information technology raises privacy issues because it makes it difficult to obtain (a) anonymity at all times; (b) control of dissemination of personal information; (c) sufficient time alone; (d) freedom from exposure to undesirable ideas; (e) none of these
2. Privacy issues are raised directly by IT due to the (a) existence of data storage media; (b) existence of digital processing; (c) ease of copying and communication; (d) existence of curiosity; (e) none of these
3. Encryption (a) provides complete privacy; (b) enables government inspection of messages; (c) provides security of varying reliability; (d) makes messages unreadable by the recipient; (e) all of the above
4. Privacy in the electronic era includes (a) anonymity at all times; (b) control of dissemination of personal information; (c) sufficient time alone; (d) freedom from exposure to undesirable ideas; (e) none of these
5. Ease of collecting data raises issues of (a) free speech; (b) protection of children from porn; (c) privacy; (d) intellectual property; (e) PC security
6. Privacy may be strongly associated with (a) notoriety; (b) seriousness; (c) freedom to post on the web; (d) freedom to criticize; (e) anonymity

### 3. Freedom of expression

1. A legal guideline specifies that speech and action are (a) in the same category; (b) incompatible; (c) distinguished; (d) protected alike; (e) none of these
2. An unprotected form of speech is (a) political; (b) economic; (c) religious; (d) repugnant; (e) defamation
3. According to our sources, widespread access to electronic media (a) raises dilemmas regarding freedom of expression; (b) limits need for first-amendment protections; (c) means that free expression is overused; (d) is harmful to free expression; (e) none of these
4. Legal guidelines for application of the First Amendment stated that conflicts should be resolved (a) quickly; (b) administratively; (c) in favor of persons asserting the right to express themselves; (d) by least-restrictive means; (e) by the market
5. Net neutrality is a form of (a) anti-spam action; (b) regulation of Internet content; (c) regulation of telcoms’ policies on Internet content; (d) election-campaign legislation; (e) none of these
6. Requiring telcoms to treat all content on broadband lines alike is (a) spam protection; (b) copyright protection; (c) child protection; (d) the digital divide; (e) net neutrality

#### 4. Intellectual property

1. The social purpose of awarding intellectual property rights has been (a) to enable maximum profit; (b) to encourage innovation; (c) to discourage sharing; (d) to discover geniuses; (e) none of these
2. Fair use is (a) justice; (b) copying for purposes of comment or research; (c) copying for resale; (d) use of copyrighted data at a fair price; (e) none of these
3. Copyright (a) dates to the 18th century; (b) is primarily for the purpose of suppressing competition; (c) dates to the start of the Internet; (d) prohibits all copying; (e) none of these
4. Intellectual artifacts (a) dissipate over time; (b) can be used by an unlimited number of persons; (c) are entirely due to their creators, rather than to previous work; (d) have no value; (e) none of these
5. Intellectual property rights are widely considered to derive in part from (a) divine sanction; (b) royal decree; (c) labor invested in creation; (d) public approval; (e) none of these
6. One limitation on intellectual property is (a) fair use; (b) universal acclaim; (c) reasonable doubt; (d) due diligence; (e) none of these
7. Copyright protects (a) ideas; (b) profits; (c) expression of ideas; (d) inexperience; (e) none of these
8. Derivative works are regulated by (a) patent; (b) trademarks; (c) trade secrets; (d) copyright; (e) copy protection
9. After a legislated period, copyrighted works enter (a) a waiting period; (b) a fair-use zone; (c) the public domain; (d) litigation; (e) none of these
10. Copying a video for later personal viewing is considered (a) a felony; (b) a misdemeanor; (c) a civil offense; (d) fair use; (e) net neutral
11. Software and electronic data are (a) sold, so that the customer has full decision power over the product (b) licensed, so that the customer agrees to restrictions on use; (c) always available for unrestricted legal copying; (d) always copyrighted by the distributor; (e) none of the above
12. Legal intellectual-property rights have been \_\_\_\_ in the Internet age (a) reduced; (b) expanded; (c) rejected by the courts; (d) abandoned by industry; (e) none of these
13. Homologization means that (a) all people have the same culture; (b) all computers work the same way; (c) all information is stored as bits; (d) all information is free to all people; (e) none of these
14. Before IT (a) it was as hard to copy a book as to write one; (b) only publishers could publish books; (c) only writers could write books; (d) sharing information was easier; (e) data was more malleable
15. Electronic publishing (a) increases costs; (b) increases risk; (c) decreases costs without effect on risk; (d) decreases costs and risk; (e) is illegal
16. A technical factor in raising intellectual-property issues is (a) cost of paper; (b) ease of copying; (c) high cost of computers; (d) relaxed morals; (e) TV culture
17. Electronic publishing (a) reduces costs; (b) increases financial risks; (c) increases costs; (d) resolves intellectual-property issues; (e) is illegal
18. Software patents could be valid if software were viewed as (a) writing; (b) art; (c) invention; (d) ideas; (e) none of these
19. Software (a) is not copyrighted; (b) is copyrightable; (c) is only seen as ideas; (d) can only be protected by patent; (e) none of these
20. File sharing with copyright implications first became widespread with (a) the personal computer; (b) CDROMs; (c) the MP3 file format; (d) email attachments; (e) Limewire
21. The music industry has faced significant difficulty with (a) iTunes; (b) peer-to-peer file sharing; (c) music sent as email; (d) the Congress; (e) none of these
22. One significant entertainment-industry measure to protect intellectual property rights has been (a) midnight raids; (b) declarations of war; (c) hardware copy protection; (d) withholding songs; (e) encryption
23. Devices that circumvent copy protection (a) are subject to lawsuit; (b) are protected by the courts as free speech; (c) are industry sanctioned; (d) are built into play-record devices; (e) none of these
24. DVD players were introduced (a) in a rapid way; (b) delayed by recording industry efforts; (c) in such a way as to encourage free copying; (d) in the 1970s; (e) none of these
25. Digital Rights Management allows (a) universal copying; (b) restricted use; (c) no use; (d) lawsuits; (e) criminal prosecution
26. Content scrambling (a) is a form of message encryption; (b) restricts DVD playing to special players; (c) controls Internet communication; (d) is a surveillance technique; (e) is a form of hacking
27. The No Electronic Theft act (a) reduced term of copyright ownership; (b) imposed copyright protection; (c) increased civil penalties for copyright violation; (d) criminalized circumvention of copyright protection; (e) criminalized copyright infringement
28. Recording a copyrighted film in a theater is (a) done by YouTube; (b) a civil offense; (c) a criminal offense; (d) considered a friendly act; (e) none of these

## ***Objectives-related study questions on topic 7 (IT and society)***

### **7a. Technological changes creating new social issues**

1. Which aspects of the information revolution raise new issues for discussion? Explain.
2. What are the social implications of IT that could affect you?
3. Describe what technical and legal assurances you would like to be in place to protect your computer's security, your personal privacy, intellectual property that you create, and your right to share information with friends.
4. What laws are violated in some file sharing?
5. How does IT raise new issues related to security and crime?
6. How have the notion and protection of *privacy* been affected by changes in technology?
7. In what ways does the information revolution raise new issues of free expression for discussion?
8. What changes in information technology raise new issues related to intellectual property?
9. What new issues related to intellectual property are raised by changes in information technology, and why?
10. What new possibilities for freedom of expression and for abuses of freedom are raised by the Internet?

### **7b. Economic changes enabled by the IT revolution**

1. When and how did the IT revolution begin?
2. How have globalization and IT contributed to each other?
3. What social or economic factors led to the IT revolution?
4. Compare *informationalism* with *industrialism*.
5. What generated informationalism?
6. What generated *globalization*, and when?
7. What is globalization and what is the role of IT in it?
8. Explain the relationship of *informationalism* to *capitalism*.
9. Explain the role of IT in the globalized economy.
10. Use the terms *informationalism*, *capitalism*, *industrialism*, and *statism* meaningfully in a paragraph.
11. What are some ways that capitalism has been restructured since the 1970s?
12. Describe different effects the Internet has on ethical systems, business or organizational policy, and legal philosophies.
13. To what degree does a problem referred to below result from digital information technology, and to what degree did the general problem pre-exist IT? Explain briefly.
  - a) ATM transactions enable tracking of our locations
  - b) Persons may record and share digital music heard on web radio broadcasts, infringing on copyrights
  - c) Digital medical records make it possible for office personnel other than doctors to obtain private patient information

### **7c. Ethical issues raised by IT**

1. What commonly valued right or prerogative is considered to be infringed by the use of video cameras on public streets? If the U.S. Constitution protects this right or prerogative, how does it do so?
2. Give reasons why free sharing of data and media should be encouraged, and give reasons why the Internet requires more enforcement of intellectual property rights.
3. Should prevention of crimes or copyright infringement be given priority over freedom to develop new products, to express ideas anonymously, or to encrypt communications?
4. Discuss a problem related to privacy or intellectual property issues, making reference both to technical factors and to ethical concerns.
5. News articles report that some law-enforcement officials asked the U.S. Congress to require that all communications-enabling services, including encrypted ones, have the technology capability to comply if served with an order to intercept communications content for surveillance purposes. Critics said that the proposal put in question fundamental aspects of Internet use. *Give technical and security reasons supporting the officials' request, and give reasons for challenging it.*
6. Articles report that massive quantities of personal data about all of us are obtainable quickly on the Web. What technical changes have brought this situation about? Give reasons to view it as unavoidable and reasons for trying to alter the situation.
7. News articles describe concerns about potential harm to patients due to malfunctions of systems for storing and retrieving patient data. Give reasons why this issue arises today and reasons to support prioritizing (a) safety; (b) privacy; or (c) maximum data collection.
8. Is it ethical for targeted commercial or political marketing to attract individual interest by changing the terms of sale or political message according to the individual's preferences? Should the profiled person be informed of the profiling? Should the law enforce ethical standards in such cases? Justify.
9. Give reasons for a rise in legitimate concern about selling violent video games to children and reasons for opposing new legislation.
10. How has the Internet changed the discussion about plagiarism?
11. A news article describes government seizure of a web site and a criminal complaint based on the claim that linking a website to copyrighted videos is a crime. Give pros and cons of the government's action and reasons why it has occurred recently rather than ten years ago.

## Study questions on multiple topics

### Multiple choice

1. *Analysis* is as opposed to (a) hypothesis; (b) parenthesis; (c) synthesis; (d) paralysis; (e) none of these
2. Analytical reasoning (a) uses inference; (b) breaks down something; (c) puts something together; (d) contradicts; (e) none of these
3. Abstraction is (a) analysis; (b) synthesis; (c) stepping away from details; (d) focusing on details; (e) reductionism
4. Stepping away from lesser details is (a) abstraction; (b) analysis; (c) synthesis; (d) ; (e) none of these
5. Absolute and relative references are found in (a) PowerPoint slides and Word files; (b) logic gates and assembler code; (c) hyperlinks and spreadsheet formulas; (d) pivot tables and filters; (e) all of these
4. Give instances of *metadata* in spreadsheets, databases, and text formatting. Explain. (0e)
5. What is *metadata*, in an IT context? Give some examples discussed in this course. (0e)
6. What single *kind* of data are all the following: named styles, spreadsheet formulas, database design specifications, HTML tags? (0e)
7. Apply the notion of *metadata* to text formatting, database management, and spreadsheets. (0e)
8. Explain the productivity concept that unifies the following: (1) MS Word style sheets; (2) Excel formulas; (3) the headings used in database tables; (4) JavaScript programs. (1e)
9. A number of *languages* were discussed in this course. Describe the languages presented in the following topics: Hardware; Spreadsheets; Database; Networked Computing; Web Design; Problem Solving and Programming.

### Longer answer

1. How has this course changed the way you think about IT?
2. Suppose that your company's Information Technology department were to suggest an upgrade to 4 GHz multi-core PCs with 64G RAM and 640G storage, using Ethernet, but mentions the option of cloud computing using thin client and 8 GHz wireless.
  - a. What questions would you ask?
  - b. Define some of the terms used above and/or relate them to business computing needs
  - c. What tools would you use to evaluate the financial considerations of upgrading, e.g., the effect of the two alternatives on net revenue?
3. Describe what application software you would use, and how, to accomplish the following tasks.
  - a. Store, retrieve, and display several thousand words of text in a report that describes services offered by a business
  - b. Store, retrieve, and display numbers that are part of a business plan, where some of the numbers depend on or summarize other numbers
  - c. Store and retrieve information about attributes of a set of items, such as products, businesses, customers, students, or college courses
  - d. Show relationships and correlations among attributes of a set of data items, such as the dependencies among location, cost, and number of rooms in homes offered for sale.
10. Explain the principle that backs the recommendation to use formulas in spreadsheets, when entering the numbers might sometimes be just as convenient? (2a)
11. What are the purposes and contents of a *journal* and of a *budget*, respectively? Describe how they may be used *together* in a spreadsheet. Refer to the use of formulas. (2e)
12. Use the terms *flowchart*, *pseudocode*, *JavaScript*, and *HTML* to contrast the concepts of web-page formatting, algorithm design, and source code.
13. Describe how a business might use spreadsheet software to make its development of a business plan more efficient. (2e)
14. What is the role of information technology in creating and executing business plans? (2e)
15. What is the main goal of businesses in using spreadsheet software? What are the purposes and contents of a journal and of a budget, respectively? Refer to the use of formulas. (2e)