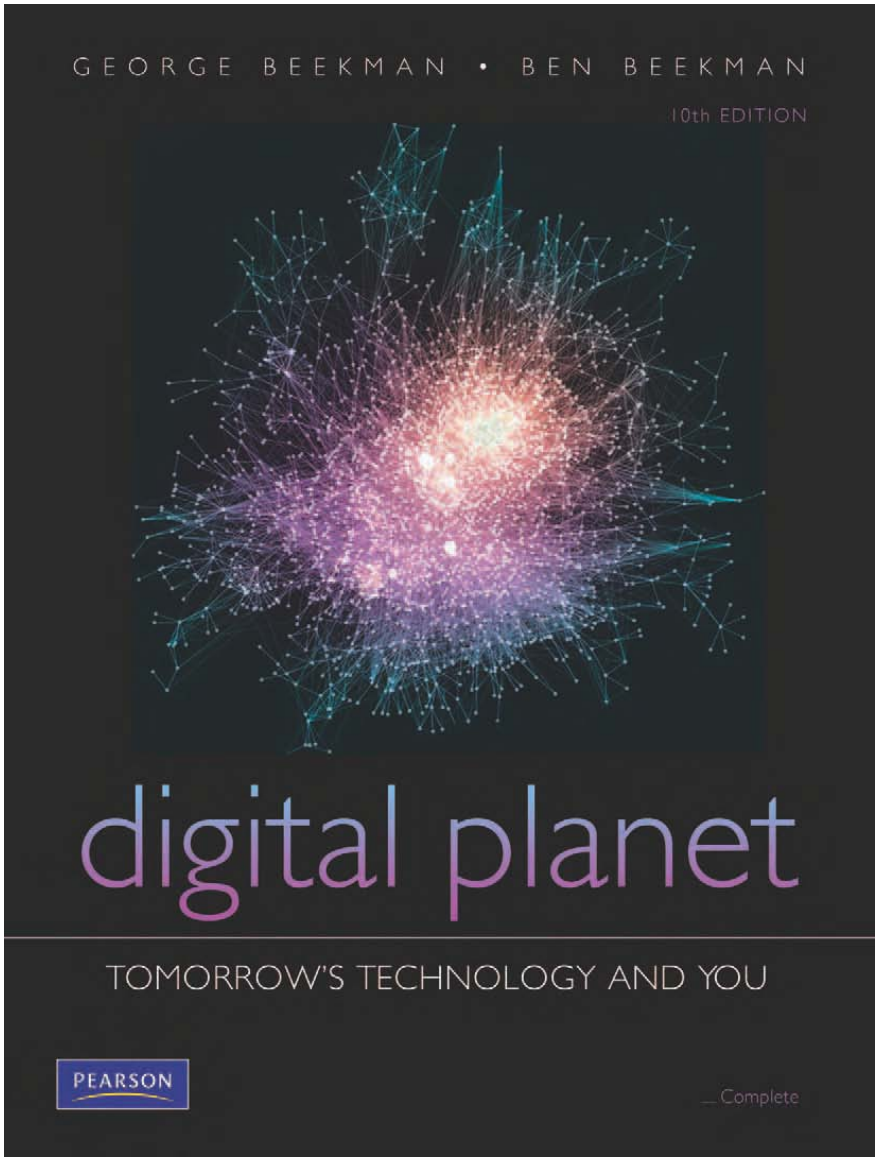

Digital Planet:

Tomorrow's Technology and You

George Beekman • Ben Beekman

Tenth Edition

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Digital Planet: Tomorrow's Technology and You

Chapter 5

Productivity Applications

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Chapter 5 Objectives

- ✓ Describe how PC and Web applications have revolutionized writing and publishing
- ✓ Discuss the potential impact of desktop publishing and Web publishing on freedom of the press
- ✓ Speculate about future developments in digital publishing
- ✓ Explain how computers can be used to answer what-if questions

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Objectives (cont.)

- ✓ Describe the functions and applications of spreadsheets and other types of statistical and simulation programs
- ✓ Explain how computers are used as tools for simulating mechanical, biological, and social systems

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The Wordsmith's Toolbox

- ✓ In a single generation the writing process has been transformed by word processing software.
- ✓ A writer can focus on developing ideas and let the machine take care of laying out words on a page.

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Donald Knuth &TEX

- ✓ The researcher whose work made all of this possible was Dr. Donald Knuth at Stanford University.
  - Originally a student at CWRU in Cleveland who had an insatiable thirst for knowledge in computer science and mathematics.
  - Had close ties with a Distinguished Professor Richard Varga in mathematics at Kent State.
- ✓ Prior to completion of masters, he secured a contract with Addison Wesley Publishers to write a comprehensive series of reference books in computer science and overlapping areas of mathematics called “Art of Computer Programming”
- ✓ Now retired from Stanford, he is devoted to bringing to completion a series covering about 7 different areas.

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Donald Knuth (cont)

- ✓ Currently has hired a large team of current and former graduate students at Stanford to move this project forward.
- ✓ Became upset when the book type setters for Addison Wesley (who physically created each page to be printed) could not print all of this reference books in this series using the same font and style.
- ✓ Created TEX software that could be used to control the formatting of printed pages, selecting font type and size, footnoting, and all aspects of printing.
- ✓ Set up copyrights this extremely valuable knowledge moved into the public domain – allowing very rapid developments
  - Assignment: Use search engine to locate Donald Knuth's webpage at Stanford University and answers to wide range of questions.

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Word Processing Tools and Techniques

- ✓ Working with a word processor involves:
  - Entering text
  - Editing text
  - Formatting the document
  - Proofreading the document
  - Saving the document
  - Printing the document
- ✓ WYSIWYG (“wizzy-wig”) for “What You See is What You Get” word processing.

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Word Processing Tools and Techniques

Text Formatting

Character

- Select font and font size
- Change color of character
- Use boldface, italics, and/or underline

Paragraph

- Control space between lines
- Set indentation and tab stops
- Justification
  - Alignment of text on a line
  - Left, right, justify, or center

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Word Processing Tools and Techniques

Document Formatting

- ✓ Margins
- ✓ Headers
- ✓ Styles
- ✓ Columns
- ✓ Tables
- ✓ Macros
- ✓ Templates
- ✓ Footnoting
- ✓ Hyphenation
- ✓ Autoformat
- ✓ Autocorrect
- ✓ Wizards

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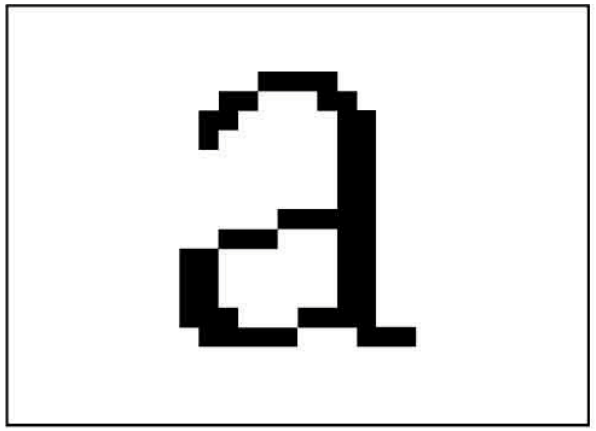
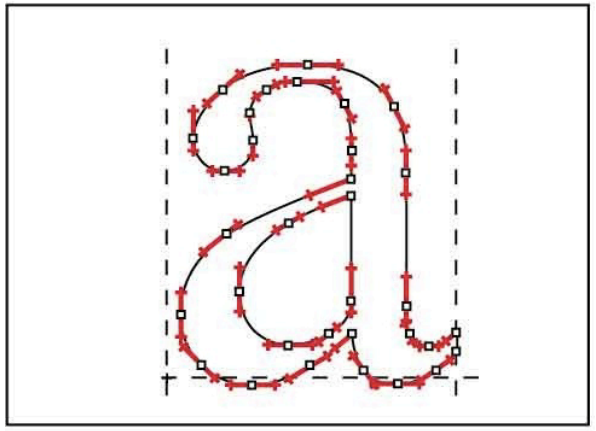
Font Technology

- A bitmapped font stores characters as a collection of tiny dots or squares.
- A scalable font represents each character as an outline that can be scaled without distortion.
- Downloadable fonts (soft fonts) are stored in the computer system and downloaded to the printer only when needed.





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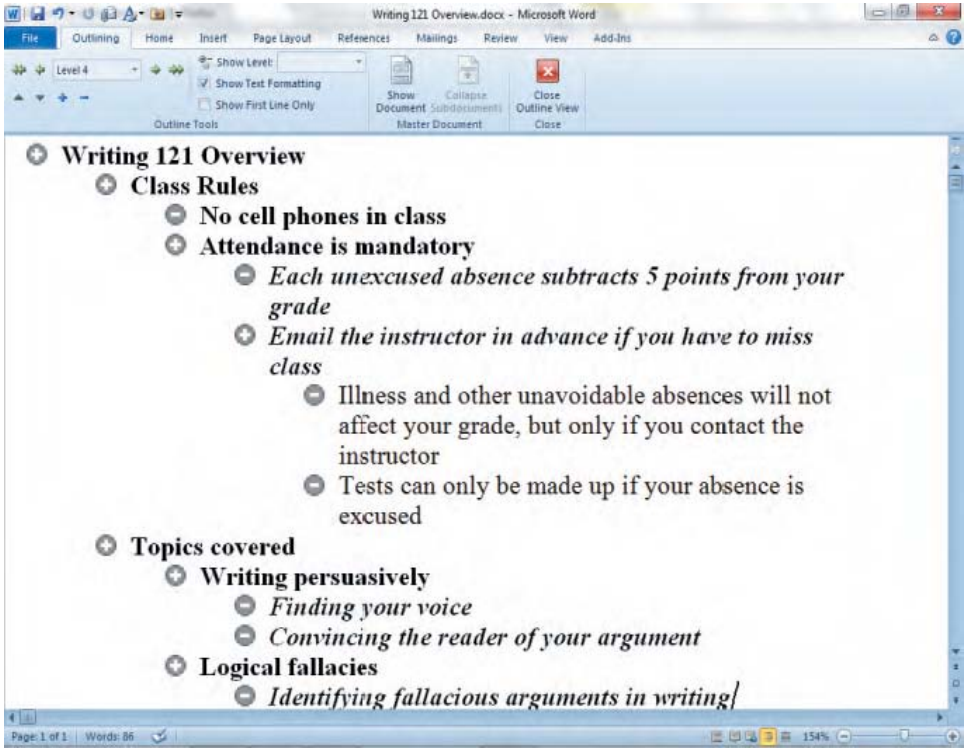
Outliners and Idea Processors

✓***Outliners:*** Effective at performing these functions:

1. Arranging information into hierarchies
2. Rearranging ideas and levels so subideas are automatically moved with parent ideas
3. Hiding and revealing levels of detail as needed



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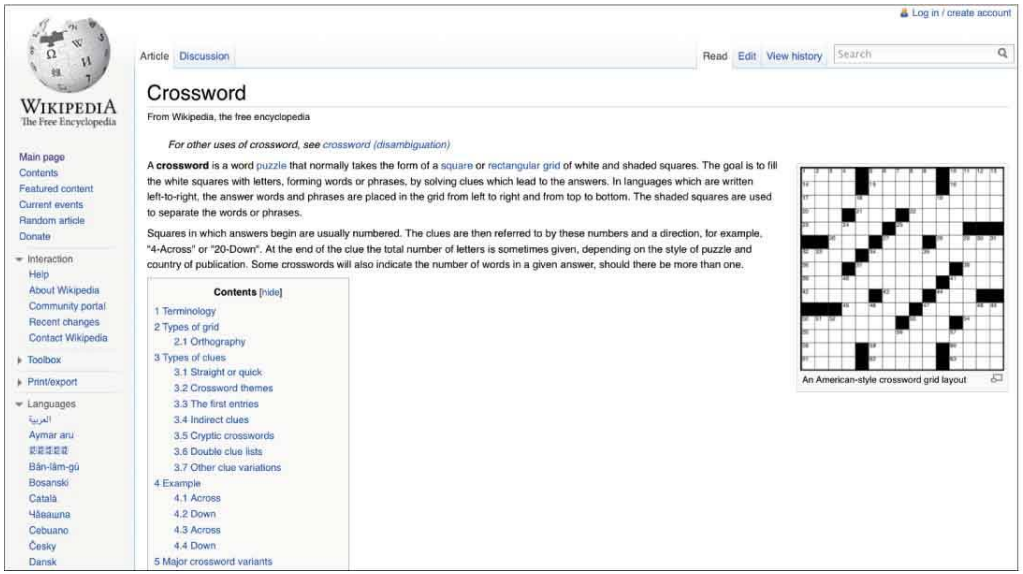
Digital References

- ✓ References available on the Web include:
  - Dictionaries
  - Quotation books
  - Encyclopedias
  - Atlases, almanacs
  - Thesaurus tools



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Spelling Checkers

- ✓ Correct spelling is an important part of written communication.
- ✓ Word processors include built-in spelling checkers.
  - Flag words not in dictionary
  - Suggest corrected spelling
- ✓ Careful proofreading is still essential.
  - No dictionary contains all words.
  - Correct spelling of words depends on the context of the sentence in which they are used.

"I wood never have guest that my spelling checker would super seed my editor as my mane source of feed back."

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Grammar and Style Checkers

- ✓ Check spelling
- ✓ Analyze each word in context
- ✓ Point out possible errors
- ✓ Suggest improvements
- ✓ Typical program misses many true errors
- ✓ Not a substitute for practice, revision, and editing

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Form-Letter Generators

- ✓ Most word processors include ***mail merge***
- ✓ Produce personalized form letters
- ✓ Generate individually addressed letters and mailing labels
  - Used with database of names and addresses
  - Can incorporate custom paragraphs
  - Makes each letter look individually written

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Collaborative Writing Tools

- ✓ Large writing projects involve groups of people working together
- ✓ Computer networks make it easy for people to share documents
- ✓ ***Groupware*** keeps track of document's history
  - Individuals make suggested changes
  - Changes are incorporated into a single master document
- ✓ Allow many people to work on manuscript at the same time.
- ✓ Microsoft Word's Track Changes can mark and highlight the changes of many authors.

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Emerging Word Tools

- ✓ Word processing software has evolved rapidly
- ✓ Current trends suggest big changes are coming
  - Processing handwriting
  - Processing speech
  - Intelligent word processors

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Processing Handwriting

- ✓ Pen-based systems provide an alternative tool for entering text.
- ✓ Handwriting recognition requires sophisticated software to interpret pen movements as characters and words.
- ✓ Diversity in handwriting makes it difficult to translate scribbles into text.

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Processing Speech

- ✓ User tells computer what to type and how to type it by talking into a microphone.
  - User's speech enters computer as digital audio signal.
  - ***Speech recognition software*** looks for patterns in the sound waves.
    - Interprets sounds by locating familiar patterns
    - Segments input sound patterns into words
    - Separates commands from text
    - Passes commands to word processing software
  - Dictation software can achieve accuracy approaching 100% under ideal conditions and "trained" to speaker.

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Intelligent Word Processors

- ✓ Some possibilities for future word processors:
  - Remind you that you have used the same word several times in the last few paragraphs
  - Analyze writing style as you type
  - Modify your writing to conform to organizational style guidelines
  - Perform search of literature on the Web and report back relevant facts

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The Desktop Publishing Story

- ✓ Publishing was traditionally an expensive, time-consuming, error-prone process.
- ✓ World of publishing was radically transformed in the 1980s.
  - Apple introduced first LaserWriter printer.
  - Aldus introduced PageMaker for the Macintosh.
- ✓ Desktop publishing became an enterprise for anyone with a computer and a little cash.

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What Is Desktop Publishing?

- ✓ Process of producing a book, magazine, or other publication includes:
  - Writing and editing text
  - Producing drawings, photographs, and other graphics
  - Designing a basic format
  - Arranging text and graphics on pages
  - Typesetting and printing pages
  - Binding pages into a finished publication

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Why Desktop Publishing?

- ✓ Offers advantages for businesses
- ✓ Saves money
  - Publishing in-house costs fractions of former costs
- ✓ Saves time
  - Turnaround is days instead of weeks or months
- ✓ Quality control is easier to maintain
- ✓ Makes it easy to repurpose content for use on Web
- ✓ Individuals have affordable publishing alternatives

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Creating Professional-Looking Documents

- ✓ Plan before you publish
- ✓ Use appropriate fonts
- ✓ Don’t go style-crazy
- ✓ Don’t go color-crazy
- ✓ Look at document though reader’s eyes
- ✓ Learn from a master
- ✓ Know your limitations
- ✓ Remember the message

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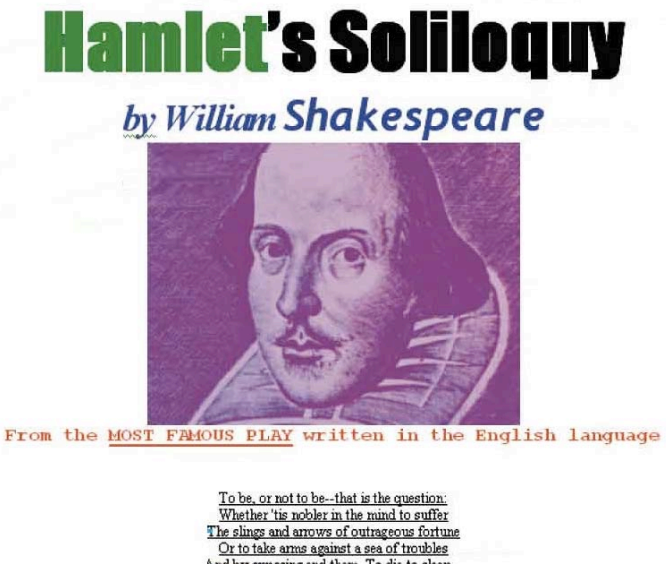
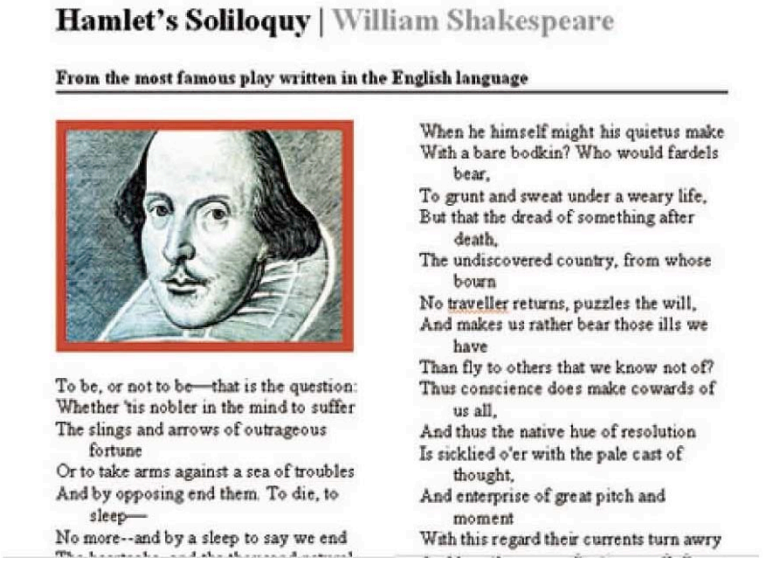
Creating Professional-Looking Documents

Bad



Good



Comparison of documents

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Beyond the Printed Page

- ✓ The first books were so difficult to produce, they were considered priceless.
- ✓ Today we can print professional-quality publications in short order using equipment that costs less than a used car.

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Paperless Publishing and the Web

- ✓ Some predict that paper publishing will be replaced by electronic media.
- ✓ Paper still offers advantages for countless tasks.
  - Reading printed words is easier on the eyes.
  - Paper documents can be read without electricity.
  - No equivalent for the aesthetics of a beautifully designed, finely crafted book.
- ✓ Digital media are likely to eclipse paper for many applications.

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Paperless Publishing and the Web (cont.)

- ✓ Offers unprecedented mass publishing possibilities to millions of Internet users.
- ✓ Many programs can save documents in HTML format
  - Microsoft Word, Adobe InDesign, Apple Pages.
- ✓ Other programs are specifically designed for Web publishing.
  - Offer advanced capabilities for layout, graphics, animation, and multimedia publishing

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E-Books, E-Readers, and E-Paper

- ✓ ***E-book:*** digital version of a book
  - May be read on a computer, PDA, smart phone, and/or an e-reader
- ✓ ***E-readers:*** handheld devices for reading digital publications
- ✓ ***E-paper:*** display technology used by most e-readers to look more like ordinary paper than an LCD display
  - Isn't backlit so more readable in sunlight
  - Stays on even when powered down.
- ✓ No universal standard for ebooks- simple file, PDF, EPUB.

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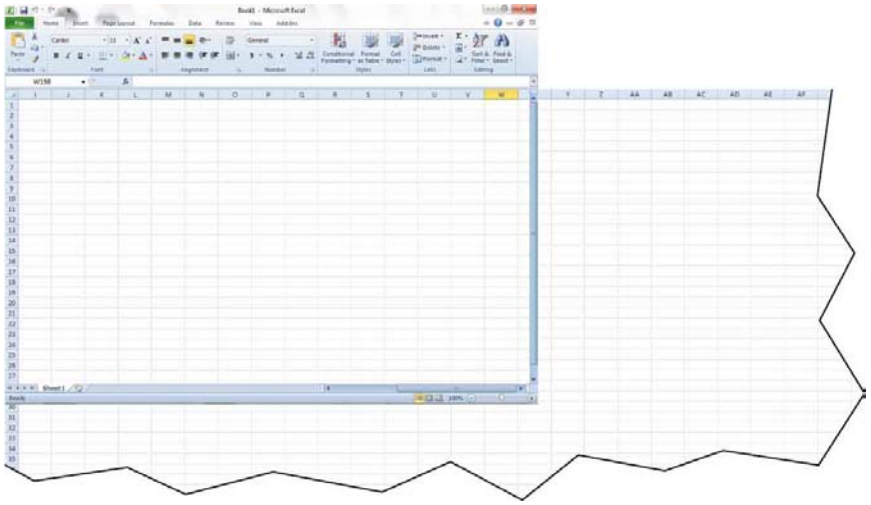
The Spreadsheet: Software for Simulation and Speculation

- ✓ ***Spreadsheet software*** enables users to take control of numbers; can make short work of tasks that involve repetitive calculations:
  - Budgeting
  - Investment management
  - Business projections
  - Grade books
  - Scientific simulations
  - Checkbooks



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The Malleable Matrix

- ✓ A spreadsheet document, called a worksheet, typically appears on the screen as a grid of numbered rows and lettered columns.
- ✓ ***Cell:*** intersection of a row and column
- ✓ Each cell contains:
  - A numeric ***value***
  - An alphabetic ***label***
  - A ***formula*** representing a relationship in other cells
- ✓ Rows and Columns are often labels such as “Midterm Exam, Total Points, Monthly Wages, etc.

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The Malleable Matrix (cont.)

Spreadsheet programs share these features:

- Managing lists
- Automatic replication
- Automatic recalculation
- Predefined functions
  - Mathematical, statistical, financial, programming -IF, etc.
- Macros
  - Capture sequence of steps to allow them to be used repeatedly
- Formatting
- Templates and wizards
- Validation
- Linking
- Database capabilities

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"What If?" Questions

- ✓ Spreadsheets are valuable for answering "what if?" questions.
- ✓ You can change numbers and instantly see the effects of those changes
- ✓ Some spreadsheet programs include ***equation solvers*** that:
  - enable you to define an equation
  - enter your target value
  - let the computer determine the necessary data values

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Spreadsheet Graphics: From Digits to Drawings

- ✓ Spreadsheet programs include charting and graphing functionality:
  - **Pie charts:** show relative proportions of parts to whole
  - **Line charts:** show trends over time
  - **Bar charts:** similar to line charts; more appropriate when data falls into a few categories
  - **Stack charts:** show how proportions of a whole change over time
  - **Scatter charts:** help discover a relationship between two variables

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Avoiding Spreadsheet and Charting Errors

- ✓ Plan worksheet before entering values and formulas
- ✓ Make assumptions as accurate as possible
- ✓ Double-check every formula and value
- ✓ Make formulas readable
- ✓ Check output against other systems

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Avoiding Spreadsheet and Charting Errors (cont.)

- ✓ Build in cross-checks
- ✓ Change the input data values and study the results
- ✓ Take advantage of preprogrammed functions, templates, and macros
- ✓ Use spreadsheet as decision-making aid, not as decision maker
- ✓ Take advantage of built-in error checking tools

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Avoiding Spreadsheet and Charting Errors (cont.)

- ✓ Choose the right chart for the job
- ✓ Put the data first in the charts
- ✓ Avoid graphic distractions
- ✓ Make it easy to compare data in your charts
- ✓ Don’t distort data
- ✓ Relate your chart to the rest of the document
- ✓ Learn from the experts

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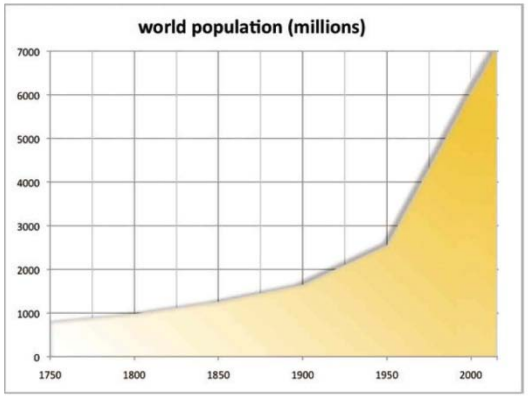
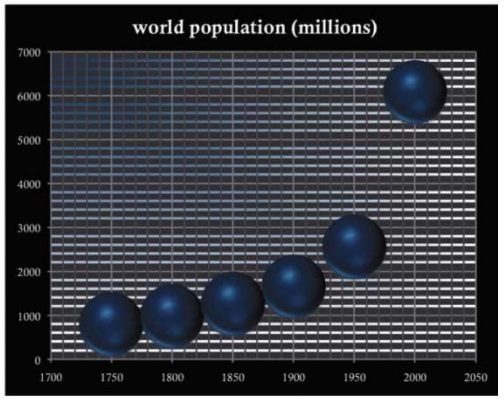
Avoiding Spreadsheet and Charting Errors (cont.)

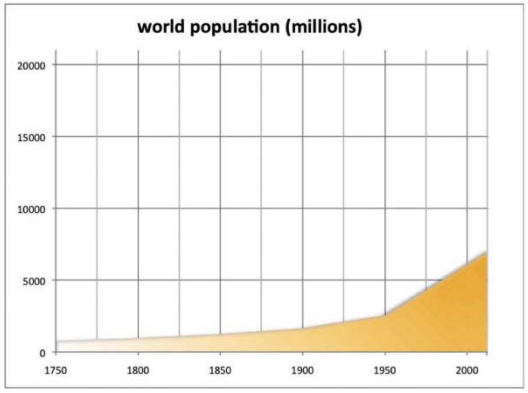
CLEAR



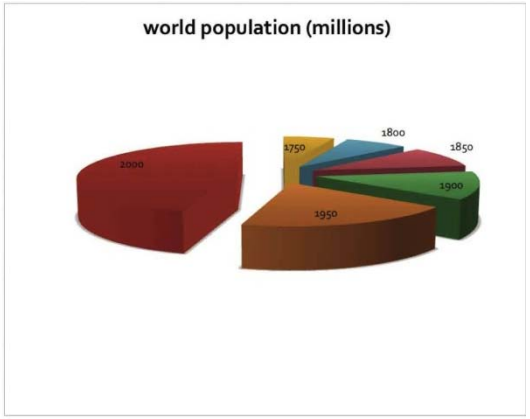
CLUTTERED



MISLEADING



CONFUSING



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Statistical Software: Beyond Spreadsheets

- ✓ Spreadsheet software is versatile, but no program is perfect for every task.
- ✓ Other types of number-manipulation software are available for situations in which spreadsheets don't quite fit the job.

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Money Managers

- ✓ Most businesses use professionally designed accounting and financial-management software.
- ✓ Records transactions—checks, cash payments, charges, and other activities
- ✓ Automatically adjusts the balance in every account after each transaction
- ✓ Can export records to programs that calculate income taxes
- ✓ Most popular is Intuit's Quicken (or Quickbooks for businesses.)

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Automatic Mathematics

- ✓ Higher mathematics is an essential part of the work of scientists, researchers, engineers, architects, economists, financial analysts, teachers, and others.
- ✓ ***Math-processing software*** makes it easier for mathematicians to create, manipulate, and solve equations
- ✓ A math processor generally includes an interactive, question-and-answer mode, a programming language, and tools for creating interactive documents that combine text, numerical expressions, and graphics
- ✓ Includes Mathematica, Matlab, Reduce and others

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Statistics and Data Analysis

- ✓ ***Statistics***—science of collecting and analyzing data—has become more important in computer age
- ✓ Statisticians in government, business, and science depend on computers to make sense of raw data
- ✓ ***Statistical-analysis software*** can suggest answers to questions by testing strength of data relationships.
  - Can suggest relationships by providing 2D and 3D graphs.

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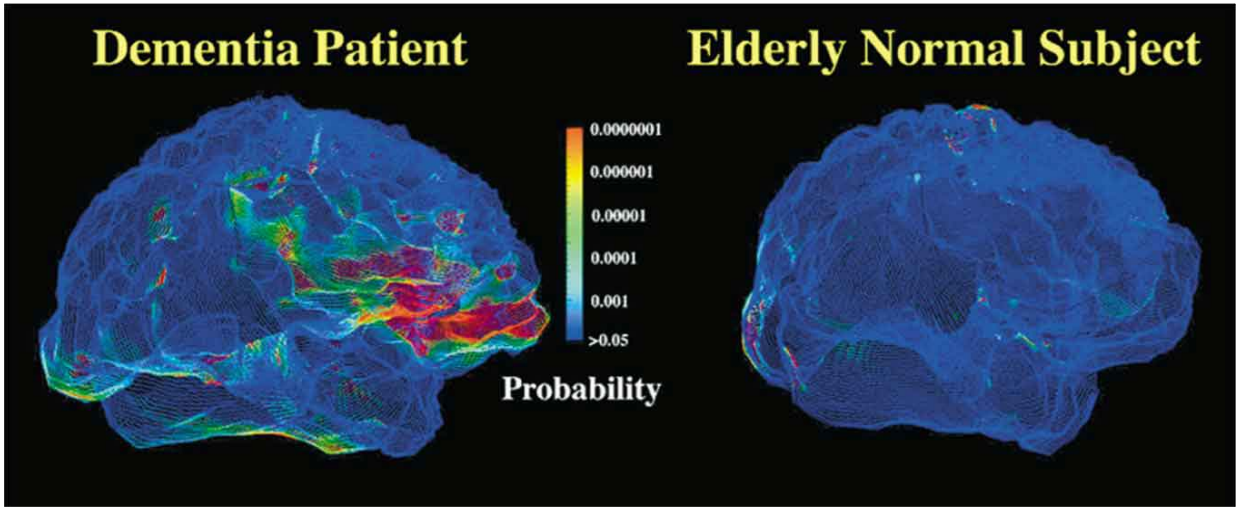
Scientific Visualization

- ✓ ***Scientific-visualization software*** uses shape, location in space, color, brightness, and motion
- ✓ Scientific visualization involves the graphical representation of numerical data



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Fractal Geometry and Simulation

- ✓ Computers have been used to analyze and visualize scientific data collected through experiments and observation.
- ✓ A computer also can serve as a virtual laboratory
- ✓ Problem of creating an accurate simulation helped initiate the study of chaos and fractals
- ✓ Chaos is now a vast field of study with applications in many disciplines.

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Calculated Risks: Computer Modeling and Simulation

- ***Computer modeling*** is the use of computers to create abstract models of objects, organisms, organizations, and processes.
- Can be created for work, education, or play, to mimic some type of system
- A computer simulation allows you to see how the model will operate under certain conditions.

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Computer Simulations: The Rewards

- ✓ Widely used for research in physical, biological, and social sciences, and in engineering for these reasons:
  - Safety
  - Economy
  - Projection
  - Visualization
  - Replication

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Computer Simulations: The Risks

- ✓ Capturing the subtlety and complexity of the real world is a tremendous challenge
  - Accuracy depends on how closely mathematical model corresponds to system being simulated.
  - Some simulations are so complex they need to be simplified to get them to run on available hardware.
  - Risks are magnified because people take computer reports seriously at expense of other sources of knowledge.

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Productivity on a Student Budget

- ✓ Low-cost or free software alternatives are available.

Software program	Alternative for:
OpenOffice	Microsoft Office
Zoho Writer or Google Docs	Microsoft Word
Zoho Sheet or Google Spreadsheet	Microsoft Excel
Zoho Show or OpenOffice Impress	Microsoft PowerPoint
Scribus	Desktop Publishing

- ✓ Most programs can save files in formats compatible with Microsoft Office so they can be shared with Office users.

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Chapter 5 Summary

- ✓ Word processing software enables the writer to edit and format text on the screen before printing.
- ✓ Desktop publishing produces professional-quality text and graphics documents at a reasonable cost.
- ✓ The Web makes it possible for publishers to reach mass audiences without the problems associated with printing and distributing paper documents.

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Summary (cont.)

- ✓ Spreadsheet programs are used for tracking financial transactions, forecasting economic conditions, recording scientific data, and other tasks that involve repetitive numeric calculations.
- ✓ Specialized accounting and tax preparation software packages perform specific financial functions.
- ✓ Symbolic mathematics processors can handle a variety of higher mathematics functions involving numbers, symbols, equations, and graphics.

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Summary (cont.)

- ✓ Statistical-analysis software is used for data collection and analysis.
- ✓ Scientific visualization can be done with math processors, statistical packages, graphics programs, or specialized programs designed for visualization.
- ✓ Computer simulation can be a powerful tool for helping people understand their world and make better decisions.

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