Today’s topics

Java
   Review
       Just a bunch of headings meant to trigger questions
       A contraction of previous notes

Upcoming
   Midterm Exam

Reading
   Great Ideas, Chapters 1-4
Review Topics

- HyperText Markup Language (HTML)
  - Linked Property Makes WWW What it is Today
  - HTML Structures
  - Tags (Note: The tags are case insensitive)
  - Ordered Lists; Unordered Lists
  - Tables
  - Links (Anchors)
  - Text Formatting
  - Carriage Returns
  - Images
Review Topics

- **An Introduction to Programming: Coding Decision Trees**
  - **Object Oriented Programming**
    - Treats everything as an Object
    - Object has Data and Functions (Methods)
    - Class Describes an Object in Java
  - **Two Ways of Using Java**
    - Stand Alone (like most traditional programs)
    - Using Web with an Applet (for this class)
  - **Example: "Hello World", Things to Note:**
    - Program is a class
    - Class contains data and methods
    - Method `init()` always started for applets
    - add statements (layout)
    - Applet invoked through HTML file
    - Program tested with Web Browser or appletviewer
Review Topics

- Demonstrate Use of Buttons; Important Pieces:
  - `actionPerformed` method
  - events, cause
  - `if` statements
- String Variables
- Reading Data Into Your Program: *Input*
  - The TextField Class
  - Example: Read In and Duplicate Demo .getText
- `if` Statements; `if` - `else` Statements
  - Logical Expression
- Assignment Statement
- Method Invocation
- Using Decisions to Solve Problems
- Example: A Number Guessing Game
  - Binary Search
Review Topics

- Decision Trees
  - Example: Text Selection Problem: Decision Tree
    - Review Code Noting myLocation Variable
- Using Primitive Data Types: Integers
- Example: Doing Multiple Tallies

**Strings and String Manipulation**

- The String Class
  - Declaration: String message;
  - String Constant: "Good Morning World!"
  - String Assignment: message = "It's Friday";
  - String Class Has Many Methods for Manipulation
    - int length()
    - int indexOf(String st)
    - String substring(int start, int end)
Review Topics

- **More About Syntax**
  1. `<name> -> any string of alphanumeric symbols that begins with a letter`
  2. `<statement> -> <name> = <expression> ;`
  3. `<statement> -> <name> = new <class>(<arguments>) ;`
  4. `<statement> -> <name>.<method>(<arguments>) | <method>(<arguments>) ;`
  5. `<arguments> -> possibly empty list of <expression>s separated by commas`
  6. `<expression> -> <string-expression> | <int-expression> | <oth-expression>`
  7. `<string-expression> -> <string-expression> + <string-expression>`
  8. `<string-expression> -> <string>`
  9. `<string> -> " any sequence of characters "`
  10. `<string> -> <name>`
Review Topics

- Numerical Computation & Study of Functions
  - New Classes for Numbers
    - `public IntField(int size);
      - `public void setInt(int number);
      - `public int getInt();
    - `public DoubleField(int size);
      - `public void setDouble(double num);
      - `public double getDouble();
  - Iteration by Button Pushing
  - The `while `Loop
  - Example: Redesign of Diamond Program
  - Arrays
    - Have Multiple Elements or Cells
    - Use Subscript or Index to Identify Element
      - Subscripts are usually integers in brackets
Review Topics

- Often Use Arrays in a Loop
- Setting Up an Array
  - `double weights[];`
  - `weights = new double[50];`
  - `double weights[] = new double[50];`
- Subscript Range Errors
- Example: Simple Statistics Program Design
  - Get Data Into Array
  - Display Data
  - Compute
  - Display
- Algorithms for Extrema
- Algorithm for Mean
Review Topics

- Top-Down Programming, Subroutines, and a Database Application
  - Functions using Functions
  - Getting Information In and Out of Functions
  - Class Data: known within class.
  - Formal Parameters/Arguments
  - Syntax: Using a Function
  - Functions that Return Values
  - Syntax: Defining a Function
  - Larger Problems: How to Deal with the Complexity
    - Divide and Conquer
  - "Parallel" Arrays or "Corresponding" Arrays
    - Model Phone Book Capability
    - Typical Access by Name
    - Access by other Fields (other arrays)
Review Topics

- Extend Idea to Database
  - Basic Database Functions
  - Wild Card Retrieval
  - Used Car Database
  - Relational Data Bases
- Recursion
  - Dictionary example
  - Base/Halting case
  - Clone model
  - Factorial \((N!\))
    - Iterative Approach for Factorial
  - Exponentiation \((X^N)\)
- Church-Markov-Turing Thesis
  - This part of Java lets you solve all kinds of algorithms