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)`
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> | <other-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
    o `public IntField(int size);`
      - `public void setInt(int number);`
      - `public int getInt();`
    o `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
    o Have Multiple Elements or Cells
    o 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 Databases

- 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