1D Arrays

- What if we need to store many values of the same type?
  - Declare and use an array data structure
- 1D Array
  - Show examples to declare, create, and index an array
    - Similarities and differences between Java arrays and Python lists
  - For loop

```
for (int idx=0; idx < arrayVarName.length; idx++)
{ //use idx to do something with each array element }
```

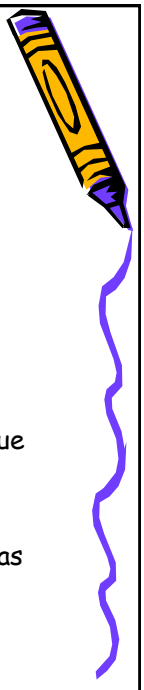
  - Foreach loop

```
for (arrayType element : arrayVarName)
{ //do something with each array element }
```


1D Arrays (cont'd)

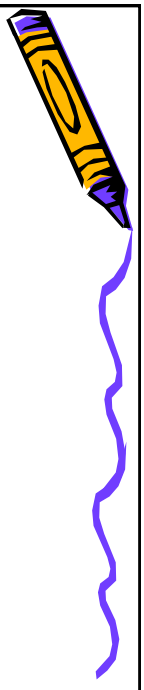
- 1D Array (cont'd)
  - Array variable is reference to array location in memory
    - Passing arrays to a method
    - Returning an array from a method
    - Copying arrays
  - Java API
    - Arrays class
      - Lots of static methods to manipulate 1D arrays, including
        - » copyOf, deepEquals, equals
    - System.arraycopy method

Extend BMI Problem Statement



- Allow user to enter many pairs of weight and height values.
- Compute and display the BMI for each pair entered.
- TUI
  - Display all weight/height pairs along with its BMI value when user exits application.
- GUI
  - Display weight/height pairs along with its BMI value as user requests each BMI calculation.

Textbook



- Previously covered
  - Most of chapter 2 (Java basics) & chapter 3 (selection)
  - Covered 4.2 (common math functions)
  - 5.2 (while)
  - 6.2, 6.3 & 6.5 (defining/calling a method, passing args)
  - 9.2, 9.4 & 9.6 (define class, construct obj, Java API)
  - 12.1 & 12.2 (exception handling)
  - Each class in its own source code file!
  - Better separation of concerns and design for reuse
  - 14.3, 14.4, 14.10 (JavaFX basics, Pane, layouts)
  - 15.2, 15.3, 15.4 (events, handlers and inner classes)
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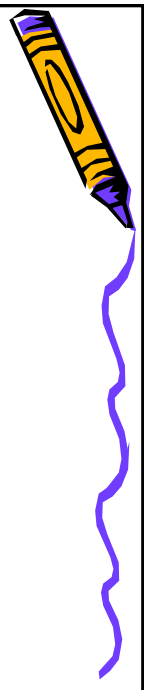
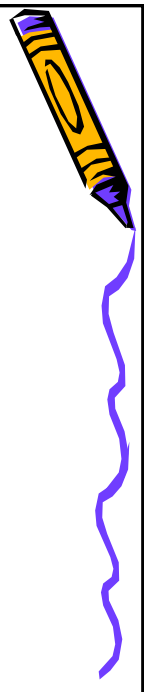
  - 10.2, 10.3, 10.4 (abstraction, encapsulation, objects, relationships)
  - 5.2, 5.3, 5.4, 5.5 (do-while, for, which loop to use?)
- Just covered
  - 7.2, 7.5, 7.6, 7.7, 7.12

More on Loops



- Loop structures (describe syntax on board)
  - While statement
  - Do-while statement
  - For statement
- Types of loop processing (do examples on board)
  - Sentinel data value
    - Loop until a *special value* is reached
  - Counting loop
    - Loop exactly X times
  - Conditional loop
    - Loop while a condition is true

Textbook



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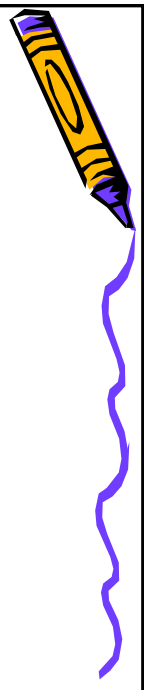
Recursion

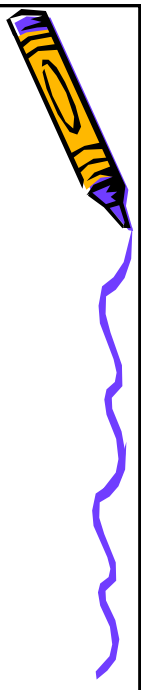
- What is it?
  - A method that calls itself!
- What should we think about when using recursion?
  - Stopping condition(s)
    - Without this, we have infinite recursion!
  - Recursive condition(s)
    - Each recursion should get "closer" to a stopping condition

Recursion
(Examples)

- recusion_1_vsIteration.java
  - Compare recursion and iteration
    - Factorial, Fibonacci
- recusion_2_Throw.java
  - Similar to _1_; includes try-catch-throw
- recusion_3_Helper.java
  - Show use of helper function
    - Factorial, Fibonacci
- recusion_4_HelperThrow.java
  - Similar to _3_; includes try-catch-throw
- recursion_5_BigInteger.java
  - Similar to _3_; no need to throw exception!



Textbook



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- Just covered
  - 18.1, 18.2, 18.3, 18.4, 18.5, 18.9 (recursion)

CSC 176 More about Classes and Objects Slide 9