

Ch6: Methods

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CMPT167
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Review of last time

■ Arrays

- Declaring, allocating, initializing
- Arrays are pass-by-reference
- Multidimensional arrays
- Iterating
- Sorting: bubble sort
- Sorting: selection sort

Some handy Math methods

- Class methods in `Math` module
 - `sqrt(x)`
 - `abs(x)`
 - `max(x, y)`, `min(x, y)`
 - `ceil(x)`, `floor(x)`
 - `cos(x)`, `sin(x)`, etc.
 - `exp(x)`, `log(x)` (natural log)
 - `pow(x, y)` (`y` can be a float)
 - `random()` (double in range `[0, 1)`)

Some handy standard packages

- `java.lang`: automatically imported
- `java.io`: files and streams
- `java.net`: networking
- `java.text`: manipulate strings, dates, i8n
- `java.util`: miscellaneous utilities: strings, etc.

- `java.applet`: or `javax.swing.JApplet` for Swing
- `java.awt`: or `javax.swing`
- `java.awt.event`: or `javax.swing.event`

Argument type promotion

- Java is statically **typed** but has some flexibility:
 - If pass a lower-precision value as a parameter, it can be **promoted**:
 - ◆ **float** --> double
 - ◆ **long** --> float or double
 - ◆ **int** --> long, float, or double
 - ◆ **char** --> int long, float, or double
 - ◆ **short** --> int, long, float, or double
 - ◆ **byte** --> short, int, long, float, or double
 - No promotions for **boolean**

Scope and duration

- The **duration** (lifetime) of an identifier is the runtime period **when** it exists in memory
 - **Automatic** duration
 - ◆ **Local** variables disappear when block finishes
 - **Static** duration
 - ◆ As long as the **object**/module/program exists
- The **scope** of an identifier is the lexical extent **where** it can be referenced
 - **Block** scope
 - **Class** scope

Scope example

```
public class ScopeExample {  
    int numApples = 0;           // class scope  
    public void listApples() {  
        int counter = 0;       // block scope  
    }  
}
```

- `numApples` is an **instance** variable with **class** scope: accessible to all **methods** of this class
- `counter` is a **local** variable with **block** scope: not accessible outside the `listApples()` method

TODO

- Lab2 due this Wed 7Feb:
 - Arrays (magic square)
 - Preferably not a command-line program
 - Applet or stand-alone GUI program
 - AWT or Swing