Processing: Basic Shapes
Student Presentation?

- This first one is voluntary!
Processing Language

- Java-based syntax for achieving graphics functionality
- Incorporates usual programming language features:
  - Functions
  - Comments
  - Expressions
Primitive Data Types

- boolean
- byte
- char
- int
- float
- color
Example Processing Setup

```java
void setup() {
    size(200, 200);
}
```
Draw Loop

- Code inside `setup()` runs once
- Code inside `draw()` runs as a continuous loop

```java
void draw() {
    background(102);
}
```
Variable scope

- Variables declared within a block are local to that block
- Global variables are declared outside of all blocks
- What is the relationship between global variables, setup() and draw()?
Consider...

```cpp
int x = 0;
void setup() {
    x += 3;
}

void draw() {
    x++;  
}
```
Coordinate Systems

- Coordinate systems define the “space” of the scene within the computer
  - World coordinate system
  - Object coordinate system
  - Camera coordinate system
  - Screen coordinate system
- Multiple coordinate systems allow for multiple levels of interaction
- Multiple coordinate systems also require conversion between systems
Screen Coordinate System

- 2-D, pixel-based coordinate system
- Based on the size (resolution) of the screen/window
- Pixel position defined using \((x, y)\) coordinate notion
Defining Geometry in Processing

- Function `point(x, y)` defines a pixel within the window.
- Function `line(x1, y1, x2, y2)` defines a line of pixels between \((x_1, y_1)\) and \((x_2, y_2)\).
Shape Primitives

- rect$(a, b, c, d)$
- ellipse$(a, b, c, d)$
- triangle$(x_1, y_1, x_2, y_2, x_3, y_3)$
- quad$(x_1, y_1, x_2, y_2, x_3, y_3, x_4, y_4)$
Curves

- arc\( (a,b,c,d,\text{start},\text{stop}) \)
- bezier\( (x_1,y_1,x_2,y_2,x_3,y_3,x_4,y_4) \)
• `arc` models elliptical arcs
• `arc` expects radians (0 to $2\pi$) rather than degrees (0 to 360) by default
• `bezier` models cubic Bezier curves
• Bezier curves are
  • Smooth
  • Scalable
  • Parametric
• `bezierVertex` can model higher order Bezier curves
Hands-on: Creating Geometry

Today’s activities:

1. Create a Processing sketch
2. Use the point, line, rect, ellipse, triangle, and quad methods
3. Experiment with the arc method
4. Experiment with the bezier method