Attributes and Modes

Elements of Graphics
CS324e
What are Shape Primitives?

- Shapes included in the library as a building block for more complex shapes
- Pieces that can be *rasterized* to screen based on pixel coordinates and other information about shape definition
What Are Attributes?

- Modify the appearance of shape primitives
- Apply to all primitives displayed after attribute
- Update the declared attribute to update the primitive’s display properties
Fill and Stroke

- `background()` sets the background color of the screen
- `fill()` sets the fill color for a shape
- `stroke()` sets the outline color for a shape
- `noFill()` and `noStroke()` prevents fill and stroke from filling a shape or drawing the stroke respectively
Consider...

```
fill(255);
stroke(0);
rect(0, 0, 50, 50);
fill(0);
stroke(255);
rect(50, 50, 50, 50);
```
What Are Modes?

- Change the functionality of shape primitive parameters
  - Same function will have a **different** outcome
- Applies to all shapes declared **after** the mode
- Update mode to update how a shape is created
Rectangle and Ellipse Modes

- `rectMode()` and `ellipseMode()` take a parameter:
  - CORNER, CORNERS, CENTER, RADIUS

- Mode parameter dictates how `rect()` and `ellipse()` parameters affect the shape
  - Changes shape’s parameter value interpretation
Consider...

rectMode(CORNER);  //default mode for rects
rect(50, 50, 100, 100);
rectMode(CORNERS);
rect(50, 50, 100, 100);
rectMode(RADIUS);
rect(50, 50, 100, 100);
rectMode(CENTER);
rect(50, 50, 100, 100);
Consider...

❖ What happens when this is the code in `draw()`?

```java
background(210);
rect(0, 0, 100, 100);
rectMode(CENTER);
rect(0, 0, 100, 100);
```
Other Modes

- Modes allow for different structural models within the same method
- Important concept in graphics!
- Other modes in Processing:
  - colorMode
  - textureMode
  - imageMode
  - shapeMode
  - blendMode
  - textMode
The order of attribute and mode commands affects the output appearance.

```javascript
stroke(100);
rect(80, 120, 150, 40);
stroke(200);
rect(50, 100, 150, 40);
```
**Draw Order**

- The order of draw commands also affects the appearance of the output!

```
rect(50, 100, 150, 40);
rect(80, 120, 150, 40);
```

vs

```
rect(80, 120, 150, 40);
rect(50, 100, 150, 40);
```
Hands-on: Using Attributes

❖ Today’s activities:

1. Experiment with attributes stroke(), fill(), noStroke(), and noFill()
2. Draw a rectangle and an ellipse then try out at least one alternate mode on these shapes
3. Experiment with attribute draw order
4. Consider the following questions:
   1. How can attribute order create the illusion of depth?
   2. How can primitive modes help us build images?