

21M.359

Lecture 3: Graphics

App Loop

```
setup()
```

```
while 1:
```

```
    handle_inputs()
```

```
    update_objects()
```

```
    draw()
```

Kivy

Framework handles draw() automatically with canvas

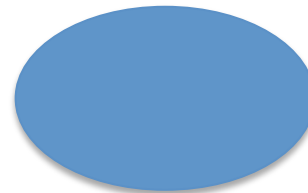
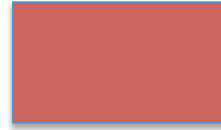
Canvas

Two types of canvas instructions:

- Drawing instructions
 - Rectangle
 - Line
 - Ellipse
- Context instructions
 - Color
 - Transforms / Frame of Reference

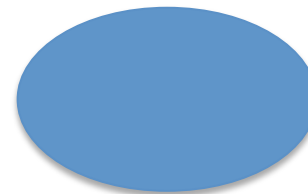
Canvas Stack

- For Example:
 - Color1 (red)
 - Rectangle1
 - Rectangle2
 - Color2 (blue)
 - Ellipse



Canvas Stack

- Modify Color1:
 - Color1 (yellow)
 - Rectangle1
 - Rectangle2
 - Color2 (blue)
 - Ellipse



Instruction Group

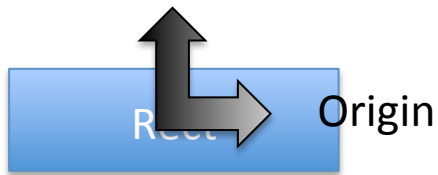
- Behaves like a single more complex canvas instruction

Transforms

- Translate(x, y)
- Rotate(angle)
- Scale(s)

Transforms

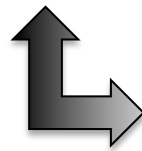
Rectangle



Transforms

Translate(20)

Rectangle



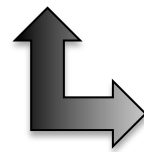
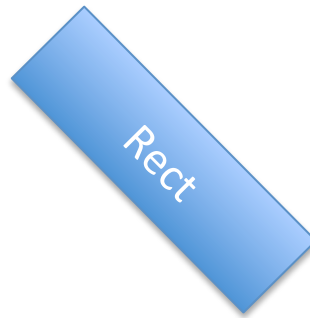
Origin

Transforms

Translate(20)

Rotate(45)

Rectangle



Origin

Transforms

Rotate(45)

Translate(20)

Rectangle

