

PENNDRAW (LECTURE)



Make sure you grab a lecture activity sheet!

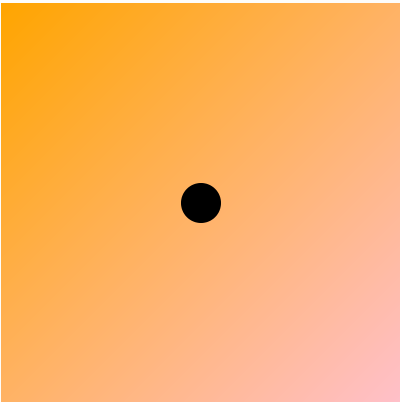
Check out cis1100.com for the live course website!

RECAP: RUNNING A SIMPLE PROGRAM IN PYTHON

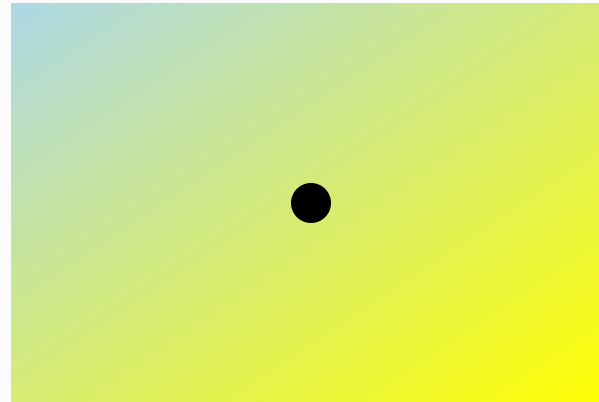
Anybody have a favorite short-ish quote that they'd like to share?

RECAP: DIMENSIONS VS. COORDINATE SYSTEM

- The *width* and *height* of the canvas can be described using pixels.
- Independent of the *width* and *height* of the canvas, we can describe a point on the screen using a coordinate pair between $(0, 0)$ and $(1, 1)$.



200x200 canvas, point at $(0.5, 0.5)$



300x200 canvas, point at $(0.5, 0.5)$

RECAP: THE PENNDRAW SANDWICH

- At the start of your PennDraw programs:

```
import penndraw as pd
```

- Nothing will appear in your output unless you add `pd.run()` to the end of your program.
 - If you don't see anything being drawn, double check that you have `pd.run()` at the very end.

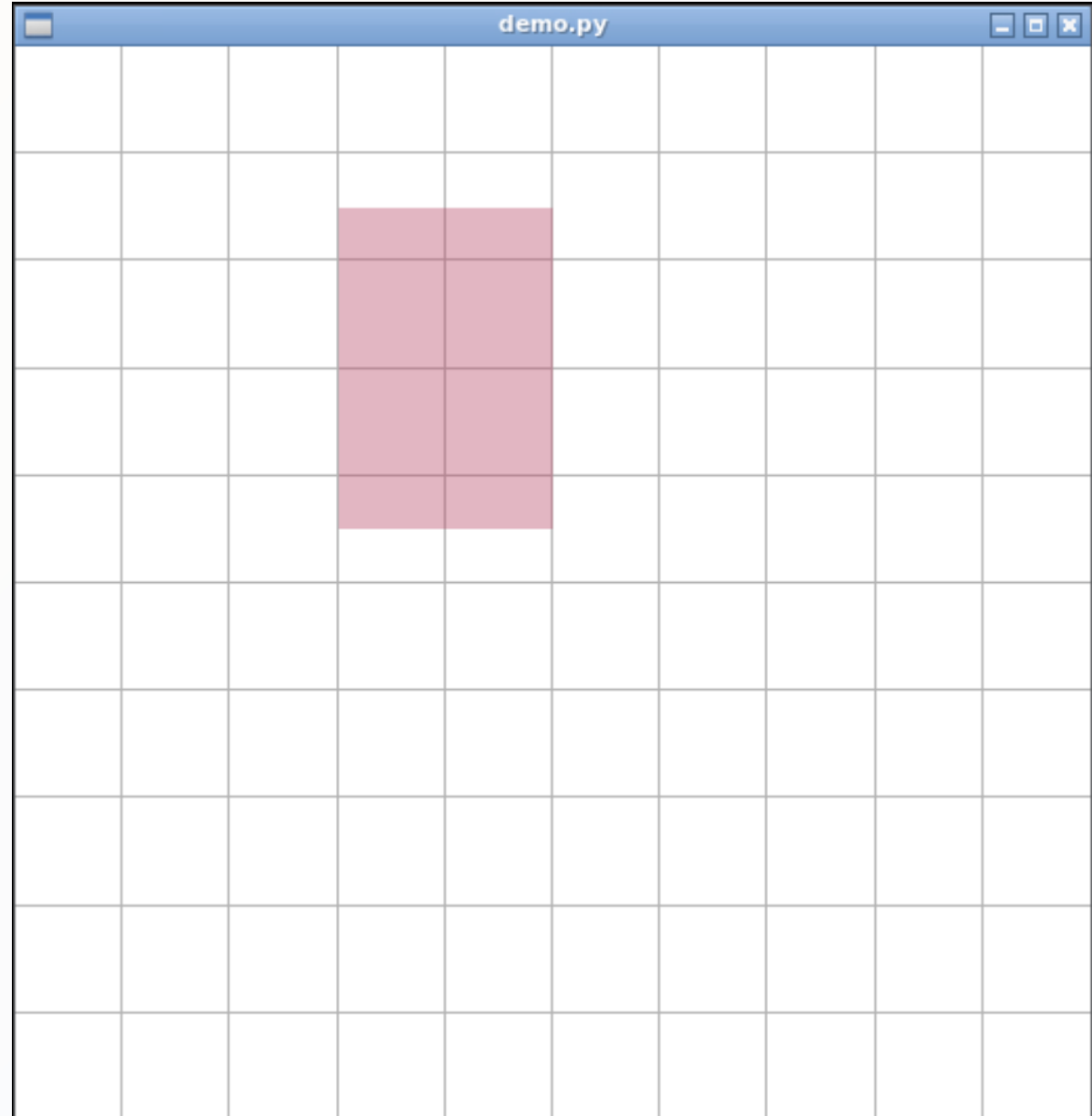
RECAP: RUNNING & STOPPING PENNDRAW PROGRAMS

- For programs that use PennDraw, the program will continue to run so that you can see the drawing you made!
- **Before re-running**, you need to stop the program execution one of two ways:
 1. Close the drawing window
 2. Press Control-C on your keyboard in the terminal

RECAP: INPUTS

`pd.filled_rectangle(...)` takes four arguments:

- `x_center`: the x coordinate of the center of the rectangle
- `y_center`: the y coordinate of the center of the rectangle
- `half_width`: the horizontal distance between side and center
- `half_height`: the vertical distance between top and center



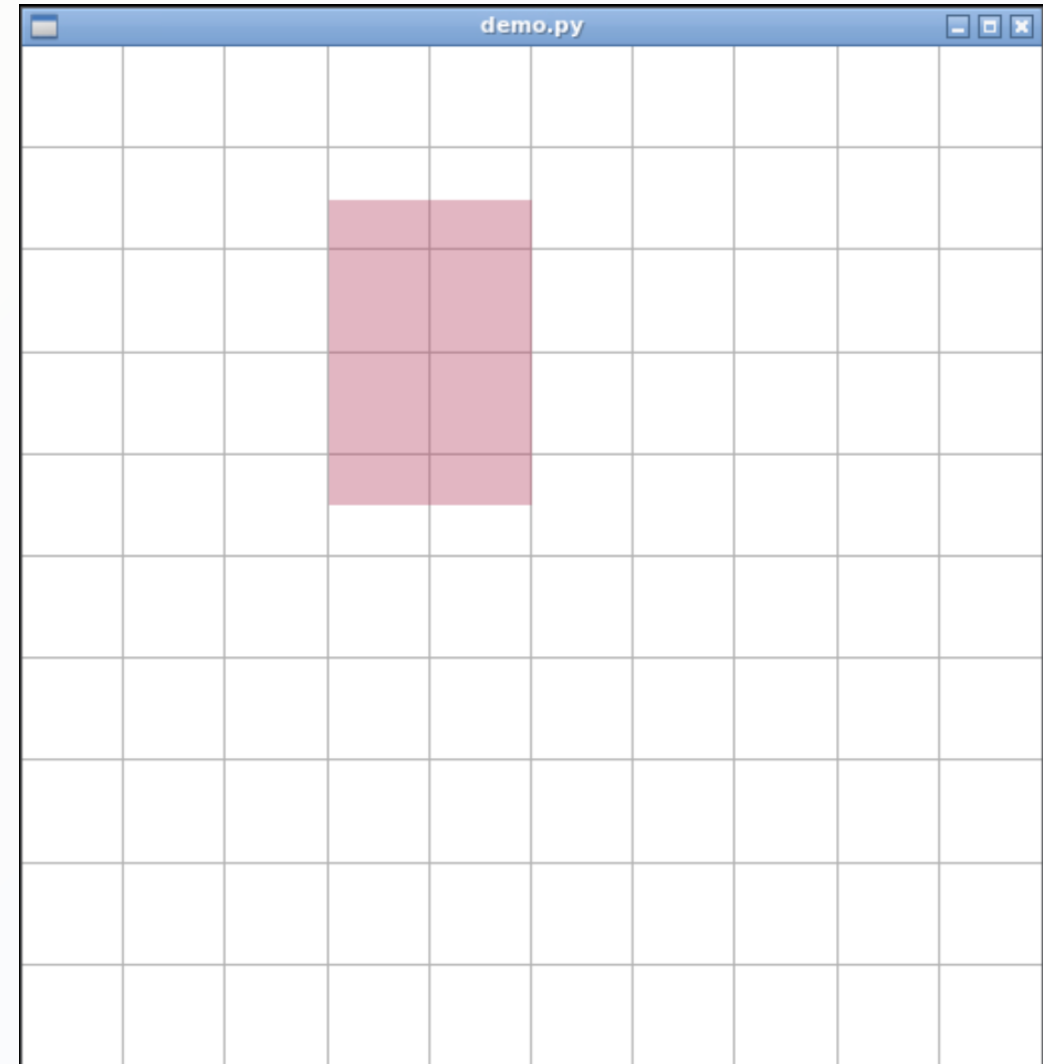
RECAP: INPUTS

`pd.filled_rectangle(...)` takes four arguments:

- `x_center` : `0.4`
- `y_center` : `0.7`
- `half_width` : `0.1`
- `half_height` : `0.15`

So:

`pd.filled_rectangle(0.4, 0.7, 0.1, 0.15)`



ACTIVITY

L1: Pick the Dimensions

```
pd.circle(x_center, y_center, radius)
```

A: (0.3, 0.8, 0.5)

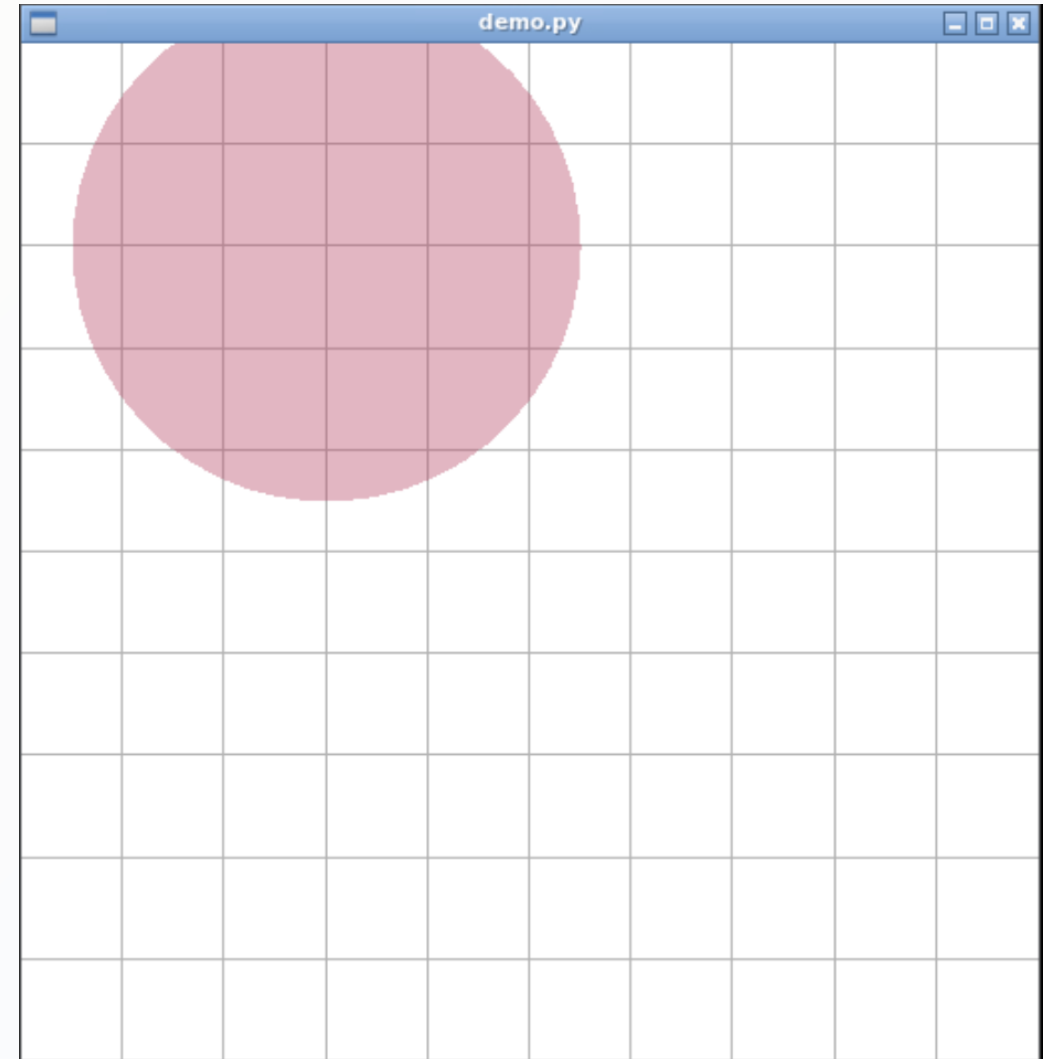
B: (0.8, 0.3, 0.25)

C: (0.3, 0.8, 0.25)

D: (0.8, 0.3, 0.125)

E: (0.4, 0.2, 0.2)

(By the way, the canvas is 512x512)



ACTIVITY: DRAW THE SHAPE (S7)

Imagine that the space for **C1** is your canvas. What would the output drawing look like?

```
import penndraw as pd

pd.set_canvas_size(400, 200)
pd.filled_rectangle(0.5, 0.75, 0.4, 0.1)

pd.run()
```

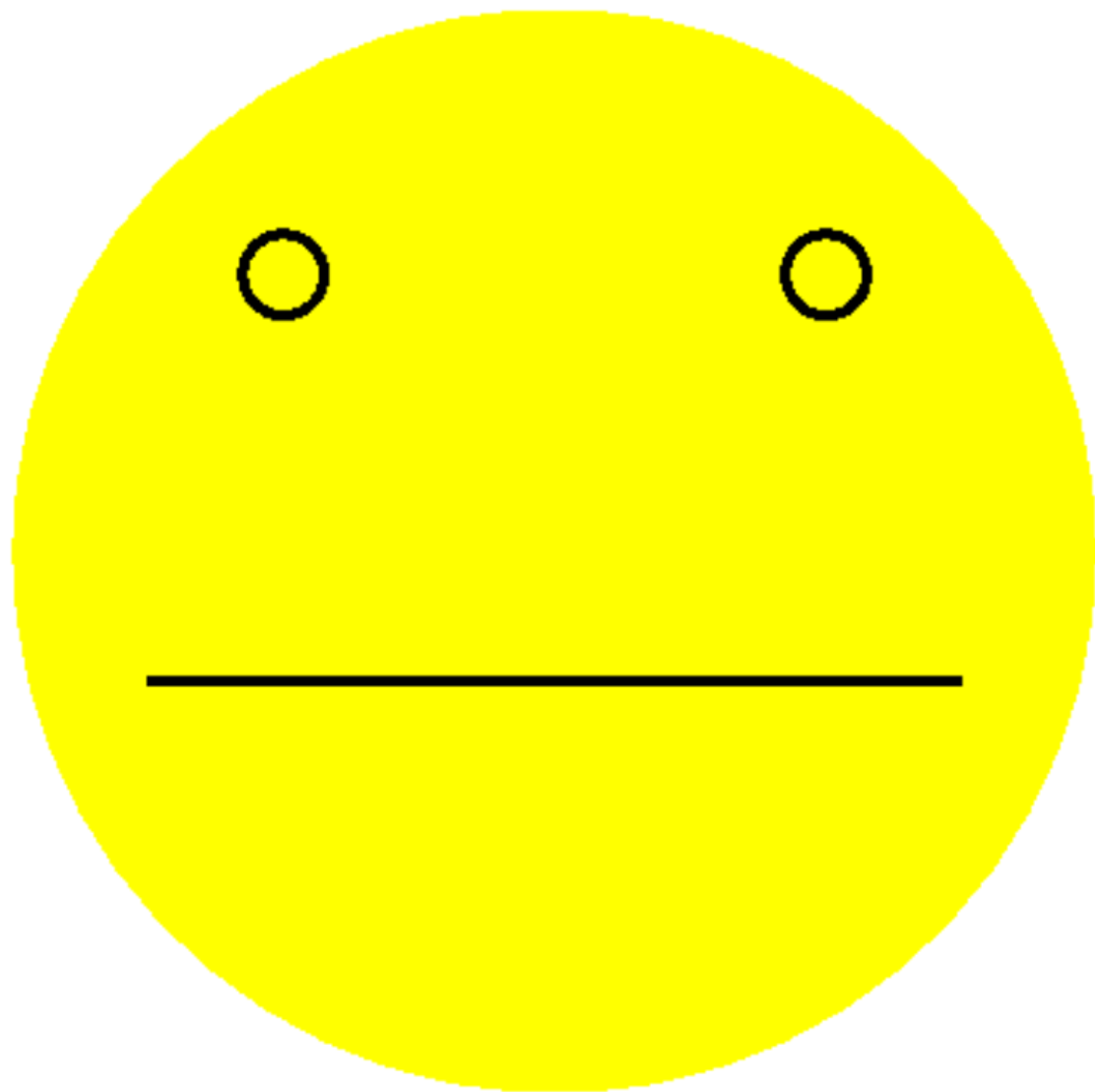
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ACTIVITY: REPRODUCE THE DRAWING

L2: What is the least number of times that you have to set the pen color to make this drawing?

C2: Write down the names of each of the `PennDraw` functions you'd need to make this drawing. Then, write the short program that can reproduce this drawing.

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3. Also, the gravity on Mars is about 38% of Earth's gravity.

ACTIVITY: MY_HOUSE_ON_MARS.PY

```
import penndraw as pd # 1
pd.clear(pd.BLUE) # 2
# draw a green field # 3
pd.set_pen_color(0, 170, 0) # 4
pd.filled_rectangle(0.5, 0.25, 0.5, 0.25) # 5
# change the pen color to a shade of yellow # 6
pd.set_pen_color(200, 170, 0) # 7
# draw a filled triangle (roof) # 8
pd.filled_polygon(0.255, 0.70, 0.745, 0.70, 0.49, 0.90) # 9
# draw the house # 10
pd.filled_rectangle(0.5, 0.52, 0.24, 0.18) # 11
```

C3: Change a line so that the ground becomes a brownish-red color. Then, change a small number of lines so that the house is tall and narrow.

REMINDERS & ANNOUNCEMENTS

- There are more videos to watch before class on Monday. (8/31)
- Regular TA Office Hours start next week (check Ed, course website for schedule)
- Recitations start next week, 8/31 and 9/1
 - These are in **Amy Gutmann Hall**, shiny new mass timber building. Very cool.

IF TIME...

What if our program didn't always draw the same picture each time?

```
import random
print("Picking a random number between 0 and 0.99999...")
my_float = random.random()
print("Picking a random integer between 1 and 100.")
my_int = random.randint(1, 100)
print("my_float:", my_float, "my_int:", my_int)
```

```
Picking a random number between 0 and 0.99999...
Picking a random integer between 1 and 100.
my_float: 0.30258196864839937 my_int: 13
```

PICKING A RANDOM COLOR

How can we fill in the blank with lines of code so that we pick a random color for our square each time?

```
import random
import penndraw as pd

# PUT SOME CODE HERE!

pd.set_pen_color(random.random(), random.random(), random.random())
pd.filled_circle(0.5, 0.5, 0.2)
pd.run()
```

PICKING A RANDOM COLOR

How can we fill in the blank with lines of code so that we pick a random color for our square each time?

```
import random
import penndraw as pd

red = random.randint(0, 255)
green = random.randint(0, 255)
blue = random.randint(0, 255)

pd.set_pen_color(red, green, blue)
pd.filled_circle(0.5, 0.5, 0.2)
pd.run()
```