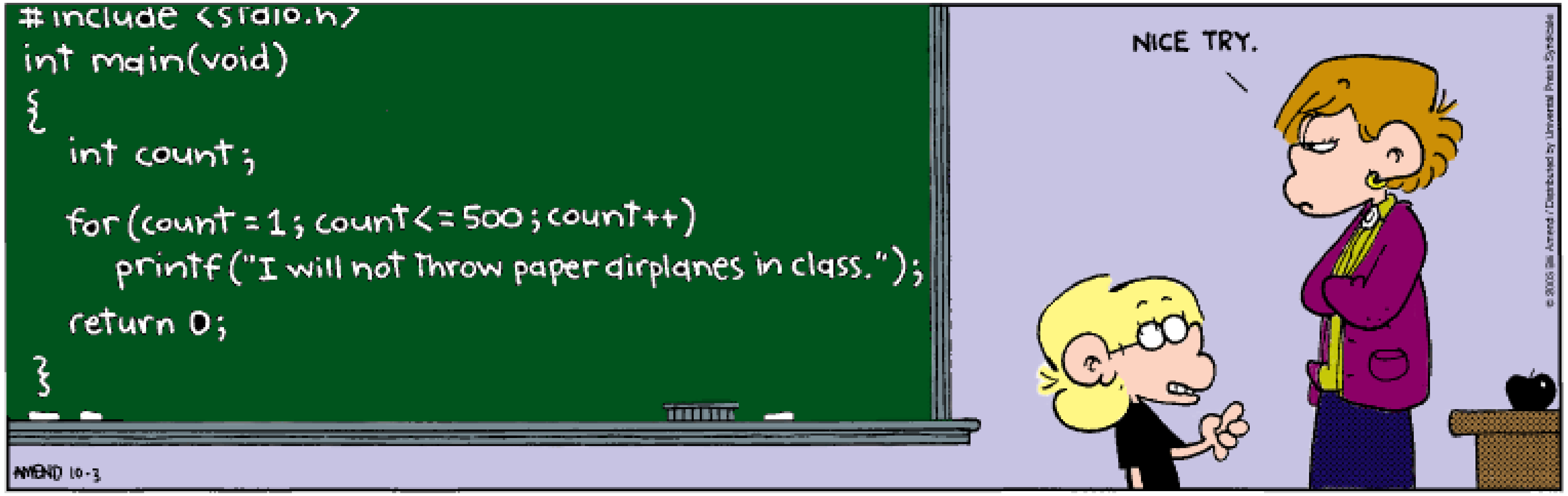
CSc 110, Autumn 2017

Lecture 9: Graphics and Nested Loops

Adapted from slides by Marty Stepp and Stuart Reges

Can you write this in Python?

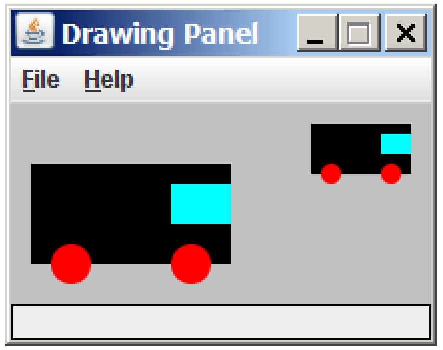


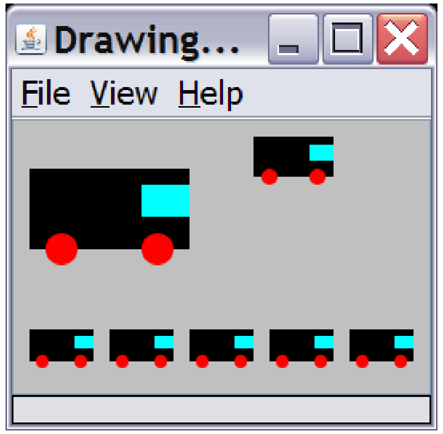
```
#include <stdio.h>
int main(void)
{
   int count;

   for(count = 1; count<=500; count++)
      printf("I will not Throw paper airplanes in class.");
   return 0;
}
```

Drawing parameter question

- Modify `draw_car` to allow the car to be drawn at any size.
  - Existing car: size 100. Second car: (150, 10), size 50.
- Once you have this working, use a `for` loop with your function to draw a line of cars, like the picture at right.
  - Start at (10, 130), each size 40, separated by 50px.





Animation with `sleep`

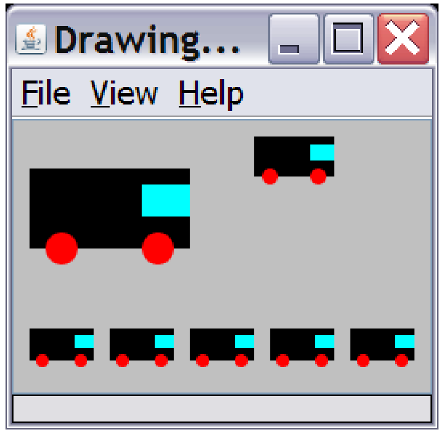
- `DrawingPanel`'s `sleep` function pauses your program for a given number of milliseconds.

- You can use `sleep` to create simple animations.

```
panel = DrawingPanel(250, 200)
for i in range(1, NUM_CIRCLES + 1):
    panel.draw_oval(15 * i, 15 * i, 30, 30)
    panel.sleep(500)
```

  - Try adding `sleep` commands to loops in past exercises in this chapter and watch the panel draw itself piece by piece.

Drawing parameter answer



```
def main():
    panel = DrawingPanel(260, 100, background="light gray")
    draw_car(panel, 10, 30, 100)
    draw_car(panel, 150, 10, 50)
    for i in range(0, 5):
        draw_car(panel, 10 + i * 50, 130, 40);

def draw_car(p, x, y, size):
    p.fill_rect(x, y, size, size / 2, "black")

    p.fill_oval(x + size / 10, y + size / 5 * 2, size / 5, size / 5, "red")
    p.fill_oval(x + size / 10 * 7, y + size / 5 * 2, size / 5, size / 5, "red")

    p.fill_rect(x + size / 10 * 7, y + size / 10, size / 10 * 3, size / 5, "cyan")
```

How to add parameters

- The panel must always be a parameter to a function that draws

- Add in position (`x, y`) parameters
  - These change `x` and `y` but not `width` and `height` of figures

- Add `size` parameter
  - This changes `width` and `height` and sometimes `x` and `y`
  - Think of all sizes and placements as percentages of the `size`
    - `size` (width) was `100`, wheel was `70` from left, that is 70% from the left so, `size / 10 * 7`

Nested Loops

- What does the following code output?

```
def main():
    for i in range(1, 10):
        for j in range(1, 10):
            print(j * i, end="\t")
        print()

main()
```

Outputting a Grid

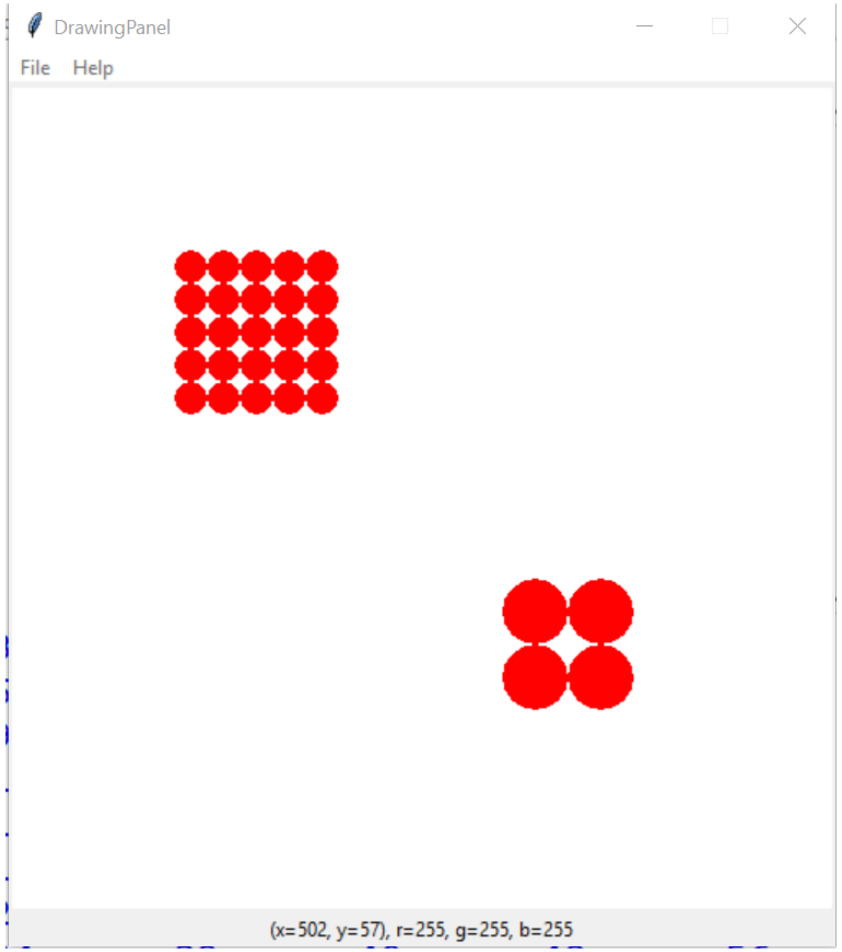
```
for i in range(n, m):
    for j in range(n, m):
        ...
```

controls the number of rows

creates a single row

Output the following figures

- Left grid:
  - `x = 100`
  - `y = 100`
  - `circle size = 20`
  - `number of circles = 5`
- Right grid:
  - `x = 300`
  - `y = 300`
  - `circle size = 40`
  - `number of circles = 2`


DrawingPanel
File
Help
(x=502, y=57), r=255, g=255, b=255