CS 110
Graphics

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Graphics in Python

- **GUI:** Graphical User Interface
- TKinter is a module for creating **GUI**s and graphics that is probably already installed on your system
- For this class, you don't have to use TKinter directly
  - Instead, use **graphics.py** which uses **TKinter**

Homework: graphics.py

- Download `graphics.py`
- Place `graphics.py` in the same directory as the program you want to write
  - For some: the **~/PycharmProjects/project_name** directory
- Write an **import** statement to allow you to use the code within:

```
from graphics import graphics
```

```python
from graphics import graphics

def main():
    # What shall we put here?
    pass

main()
```

Making graphics

- When using graphics.py, you can create a **canvas**, and then draw shapes and text on the canvas.
- What is a canvas?
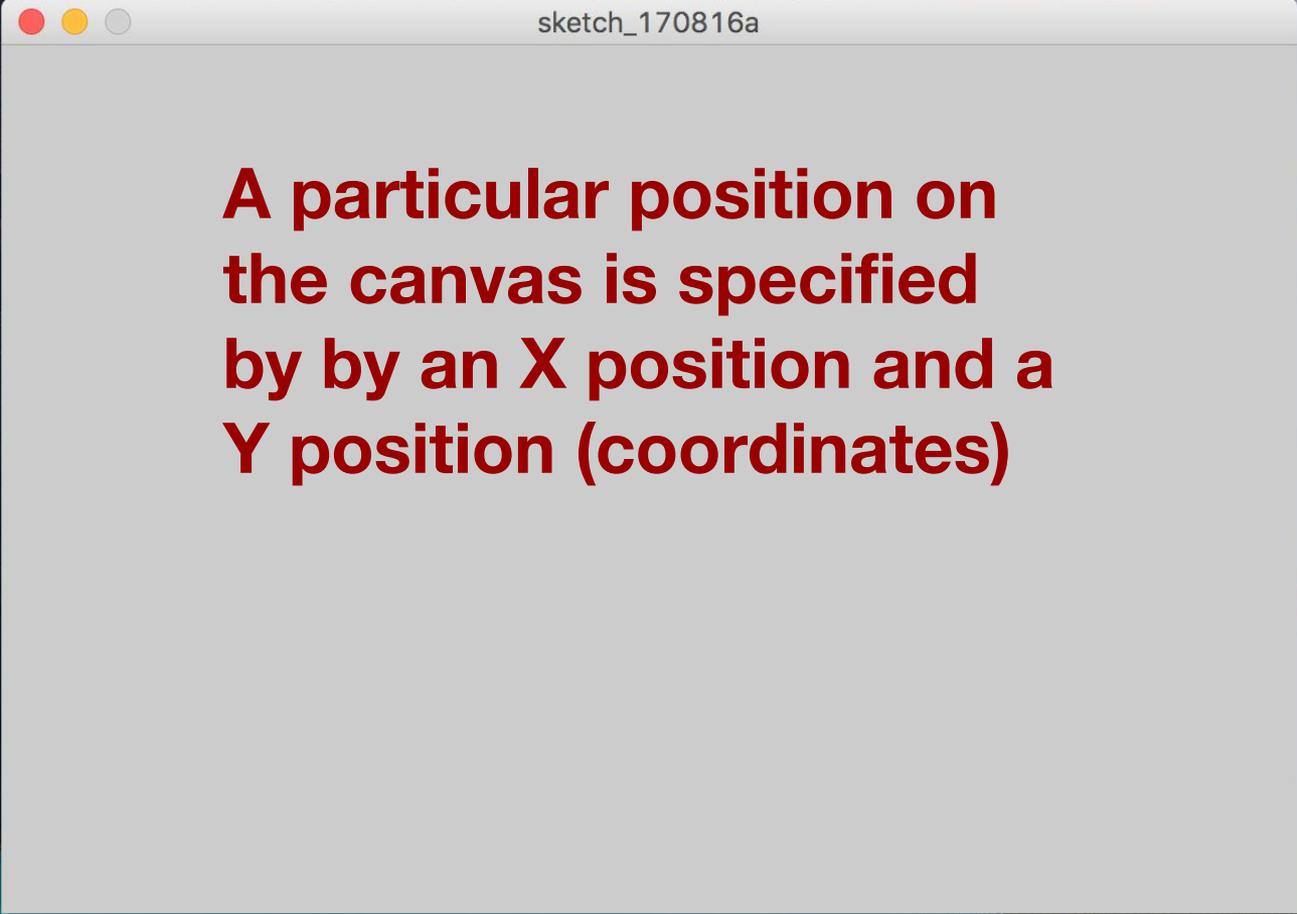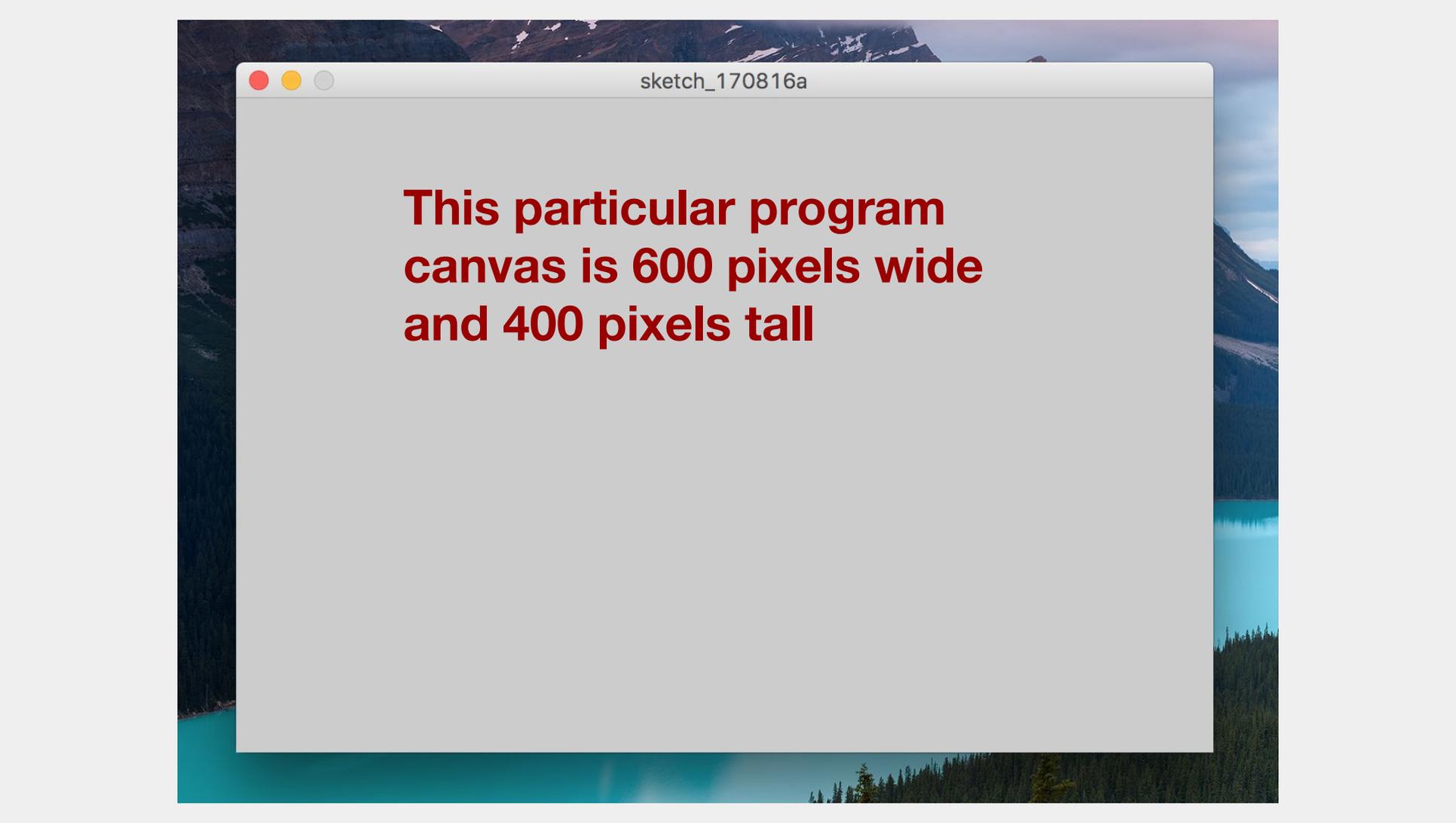
sketch_170816a

This particular program canvas is 600 pixels wide and 400 pixels tall
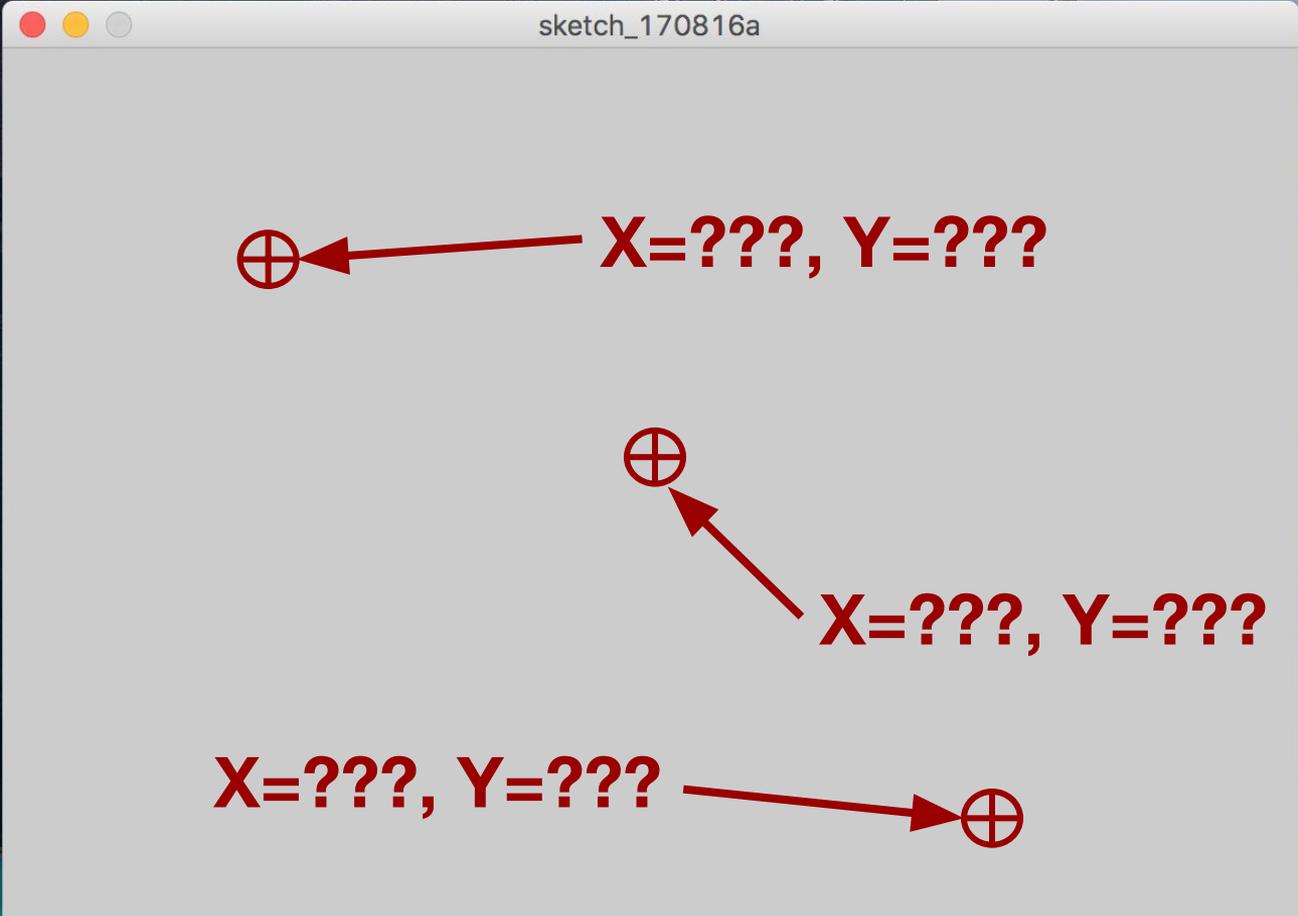
Creating a canvas

Use the code below:

```
gui = graphics(width, height, 'title')
```

The **gui** variable is of type `graphics.graphics` (we can just refer to it as a **graphics** type). This is a **graphics object**.

We can call methods (functions) using this object.

Draw the canvas

```python
from graphics import graphics

def main():
    gui = graphics(700, 300, 'Three Squares')
    gui.draw()

main()
```

The canvas...

```python
from graphics import graphics

def main():
    gui = graphics(700, 300, 'Three Squares')
    gui.draw()


main()
```
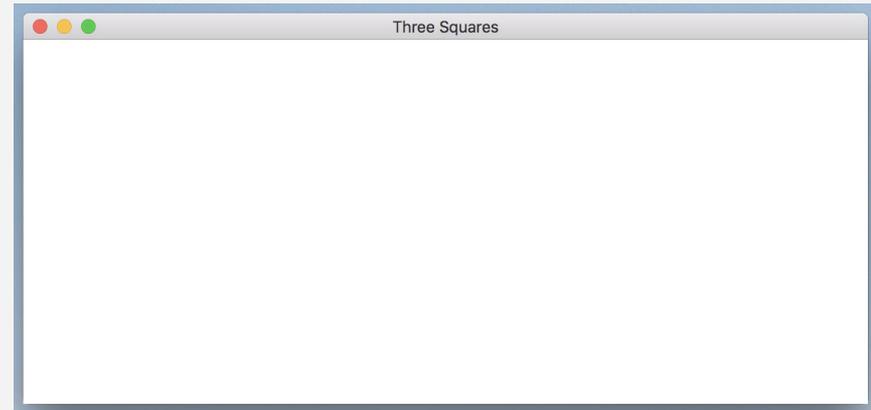
Draw a rectangle

```
gui.rectangle(x, y, w, h, fill)
```

What will this display?

- Label the colors with text   *Recall:* `gui.rectangle(x, y, w, h, fill)`

```python
from graphics import graphics

def main():
    gui = graphics(700, 300, 'Three Squares')
    gui.rectangle( 25, 50, 200, 200, 'black')
    gui.rectangle(250, 50, 200, 200, 'purple')
    gui.rectangle(475, 50, 200, 200, 'orange')
    gui.draw()

main()
```

What will this display?

- Label the colors with text

```python
from graphics import graphics


def main():
    gui = graphics(700, 300, 'Three Squares')
    gui.rectangle( 25, 50, 200, 200, 'black')
    gui.rectangle(250, 50, 200, 200, 'purple')
    gui.rectangle(475, 50, 200, 200, 'orange')
    gui.draw()


main()
```

What will this display?

- Label the colors with text   *Recall:* `gui.rectangle(x, y, w, h, fill)`

```python
from graphics import graphics

def main():
    gui = graphics(700, 300, 'Three Squares')
    gui.rectangle( 25, 25, 500, 100, 'green')
    gui.rectangle(150, 0, 50, 300, 'red')
    gui.rectangle(500, 0, 200, 300, 'blue')
    gui.rectangle(300, 100, 50, 50, 'orange')
    gui.draw()

main()
```

What will this display?

- Label the colors with text

```python
from graphics import graphics

def main():
    gui = graphics(700, 300, 'Three Squares')
    gui.rectangle( 25, 25, 500, 100, 'green')
    gui.rectangle(150, 0, 50, 300, 'red')
    gui.rectangle(500, 0, 200, 300, 'blue')
    gui.rectangle(300, 100, 50, 50, 'orange')
    gui.draw()

main()
```

What will this display?

- Label the colors with text   *Recall:* `gui.rectangle(x, y, w, h, fill)`

```python
def main():
    gui = graphics(700, 300, 'Lines')
    i = 10
    while i < 700:
        gui.rectangle(i, 50, 20, 200, 'blue')
        i += 70
    gui.draw()

main()
```

What will this display?

- Label the colors with text

```python
def main():
    gui = graphics(700, 300, 'Lines')
    i = 10
    while i < 700:
        gui.rectangle(i, 50, 20, 200, 'blue')
        i += 70
    gui.draw()

main()
```

What else can be displayed?

```
gui.ellipse(x, y, w, h, fill)
```

What else can be displayed?

```
gui.line(x1, y1, x2, y2, fill, width)
```

What else can be displayed?

```
gui.triangle(x1, y1, x2, y2, x3, y3, fill)
```

What else can be displayed?

`gui.rectangle(x, y, w, h, fill)`

`gui.ellipse(x, y, w, h, fill)`

`gui.line(x1, y1, x2, y2, fill, width)`

`gui.triangle(x1, y1, x2, y2, x3, y3, fill)`

What will this display?

Recall:

```
gui.ellipse(x, y, w, h, fill)
gui.line(x1, y1, x2, y2, fill, width)
```

- Label the colors with text

```
gui = graphics(500, 500, 'Lines')
i = 100
while i < 450:
    if i % 100 == 0:
        gui.ellipse(i, i, 75, 75, 'blue')
    else:
        gui.line(i, 0, i, 500, 'green', 10)
    i += 50
gui.draw()
```

What will this display?

- Label the colors with text


```
gui = graphics(500, 500, 'Lines')
i = 100
while i < 450:
    if i % 100 == 0:
        gui.ellipse(i, i, 75, 75, 'blue')
    else:
        gui.line(i, 0, i, 500, 'green', 10)
    i += 50
gui.draw()
```
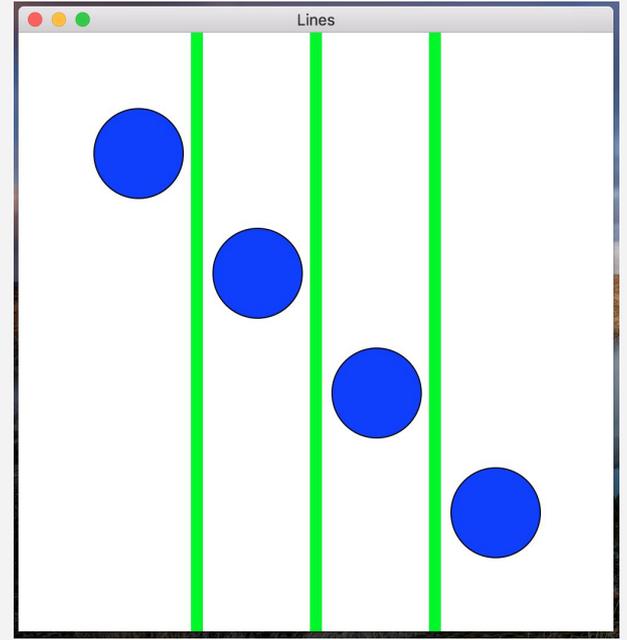
http://www.science.smith.edu/dftwiki/index.php/Color_Charts_for_TKinter

Named colour chart

snow	deep sky blue	gold	seashell3	SlateBlue2	LightBlue3	SpringGreen2	DarkGoldenrod1	brown4	pink3	purple1		gray26	gray64
ghost white	sky blue	light goldenrod	seashell4	SlateBlue3	LightBlue4	SpringGreen3	DarkGoldenrod2	salmon1	pink4	purple2		gray27	gray65
white smoke	light sky blue	goldenrod	AntiqueWhite1	SlateBlue4	LightCyan2	SpringGreen4	DarkGoldenrod3	salmon2	LightPink1	purple3		gray28	gray66
gainsboro	steel blue	dark goldenrod	AntiqueWhite2	RoyalBlue1	LightCyan3	green2	DarkGoldenrod4	salmon3	LightPink2	purple4		gray29	gray67
floral white	light steel blue	rosy brown	AntiqueWhite3	RoyalBlue2	LightCyan4	green3	RosyBrown1	salmon4	LightPink3	MediumPurple1		gray30	gray68
old lace	light blue	indian red	AntiqueWhite4	RoyalBlue3	PaleTurquoise1	green4	RosyBrown2	LightSalmon2	LightPink4	MediumPurple2		gray31	gray69
linen	powder blue	saddle brown	bisque2	RoyalBlue4	PaleTurquoise2	chartreuse2	RosyBrown3	LightSalmon3	PaleVioletRed1	MediumPurple3		gray32	gray70
antique white	pale turquoise	sandy brown	bisque3	blue2	PaleTurquoise3	chartreuse3	RosyBrown4	LightSalmon4	PaleVioletRed2	MediumPurple4		gray33	gray71
papaya whip	dark turquoise	dark salmon	bisque4	blue4	PaleTurquoise4	chartreuse4	IndianRed1	orange2	PaleVioletRed3	thistle1		gray34	gray72
blanched almond	medium turquoise	salmon	PeachPuff2	DodgerBlue2	CadetBlue1	OliveDrab1	IndianRed2	orange3	PaleVioletRed4	thistle2		gray35	gray73
bisque	turquoise	light salmon	PeachPuff3	DodgerBlue3	CadetBlue2	OliveDrab2	IndianRed3	orange4	maroon1	thistle3		gray36	gray74
peach puff	cyan	orange	PeachPuff4	DodgerBlue4	CadetBlue3	OliveDrab4	IndianRed4	DarkOrange1	maroon2	thistle4		gray37	gray75
navajo white	light cyan	dark orange	NavajoWhite2	SteelBlue1	CadetBlue4	DarkOliveGreen1	sienna1	DarkOrange2	maroon3		gray1	gray38	gray76
lemon chiffon	cadet blue	coral	NavajoWhite3	SteelBlue2	turquoise1	DarkOliveGreen2	sienna2	DarkOrange3	maroon4		gray2	gray39	gray77
mint cream	medium aquamarine	light coral	NavajoWhite4	SteelBlue3	turquoise2	DarkOliveGreen3	sienna3	DarkOrange4	VioletRed1		gray3	gray40	gray78
azure	aquamarine	tomato	LemonChiffon2	SteelBlue4	turquoise3	DarkOliveGreen4	sienna4	coral1	VioletRed2		gray4	gray42	gray79
alice blue	dark green	orange red	LemonChiffon3	DeepSkyBlue2	turquoise4	khaki1	burlywood1	coral2	VioletRed3		gray5	gray43	gray80
lavender	dark olive green	red	LemonChiffon4	DeepSkyBlue3	cyan2	khaki2	burlywood2	coral3	VioletRed4		gray6	gray44	gray81
lavender blush	dark sea green	hot pink	cornsilk2	DeepSkyBlue4	cyan3	khaki3	burlywood3	coral4	magenta2		gray7	gray45	gray82
misty rose	sea green	deep pink	cornsilk3	SkyBlue1	cyan4	khaki4	burlywood4	tomato2	magenta3		gray8	gray46	gray83
dark slate gray	medium sea green	pink	cornsilk4	SkyBlue2	DarkSlateGray1	LightGoldenrod1	wheat1	tomato3	magenta4		gray9	gray47	gray84
dim gray	light sea green	light pink	ivory2	SkyBlue3	DarkSlateGray2	LightGoldenrod2	wheat2	tomato4	orchid1		gray10	gray48	gray85
slate gray	pale green	pale violet red	ivory3	SkyBlue4	DarkSlateGray3	LightGoldenrod3	wheat3	OrangeRed2	orchid2		gray11	gray49	gray86
light slate gray	spring green	maroon	ivory4	LightSkyBlue1	DarkSlateGray4	LightGoldenrod4	wheat4	OrangeRed3	orchid3		gray12	gray50	gray87
gray	lawn green	medium violet red	honeydew2	LightSkyBlue2	aquamarine2	LightYellow2	tan1	OrangeRed4	orchid4		gray13	gray51	gray88
light grey	medium spring green	violet red	honeydew3	LightSkyBlue3	aquamarine4	LightYellow3	tan2	red2	plum1		gray14	gray52	gray89
midnight blue	green yellow	medium orchid	honeydew4	LightSkyBlue4	DarkSeaGreen1	LightYellow4	tan4	red3	plum2		gray15	gray53	gray90
navy	lime green	dark orchid	LavenderBlush2	SlateGray1	DarkSeaGreen2	yellow2	chocolate1	red4	plum3		gray16	gray54	gray91
cornflower blue	yellow green	dark violet	LavenderBlush3	SlateGray2	DarkSeaGreen3	yellow3	chocolate2	DeepPink2	plum4		gray17	gray55	gray92
dark slate blue	forest green	blue violet	LavenderBlush4	SlateGray3	DarkSeaGreen4	yellow4	chocolate3	DeepPink3	MediumOrchid1		gray18	gray56	gray93
slate blue	olive drab	purple	MistyRose2	SlateGray4	SeaGreen1	gold2	firebrick1	DeepPink4	MediumOrchid2		gray19	gray57	gray94
medium slate blue	dark khaki	medium purple	MistyRose3	LightSteelBlue1	SeaGreen2	gold3	firebrick2	HotPink1	MediumOrchid3		gray20	gray58	gray95
light slate blue	khaki	thistle	MistyRose4	LightSteelBlue2	SeaGreen3	gold4	firebrick3	HotPink2	MediumOrchid4		gray21	gray59	gray97
medium blue	pale goldenrod	snow2	azure2	LightSteelBlue3	PaleGreen1	goldenrod1	firebrick4	HotPink3	DarkOrchid1		gray22	gray60	gray98
royal blue	light goldenrod yellow	snow3	azure3	LightSteelBlue4	PaleGreen2	goldenrod2	brown1	HotPink4	DarkOrchid2		gray23	gray61	gray99
blue	light yellow	snow4	azure4	LightBlue1	PaleGreen3	goldenrod3	brown2	pink1	DarkOrchid3		gray24	gray62	
dodger blue	yellow	seashell2	SlateBlue1	LightBlue2	PaleGreen4	goldenrod4	brown3	pink2	DarkOrchid4		gray25	gray63	

Make your program display a canvas like the one shown
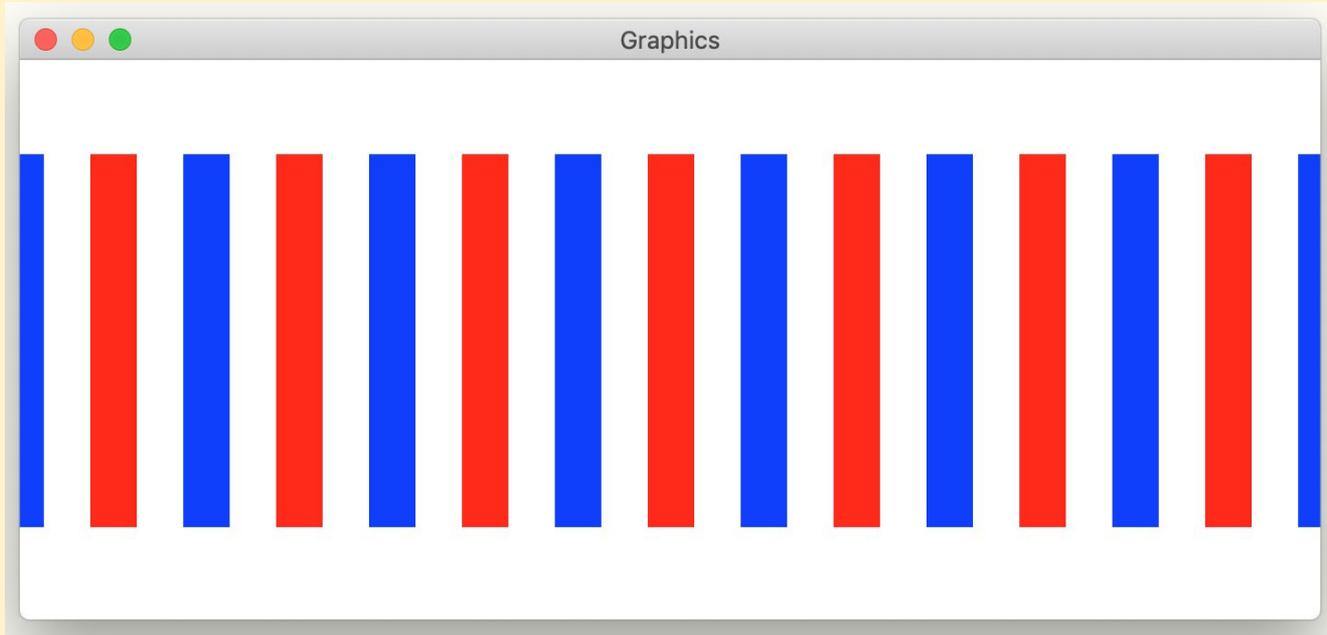
Make your program display a canvas like the one shown


```python
def main():
    gui = graphics(700, 300, 'Graphics')
    # What goes here?
```
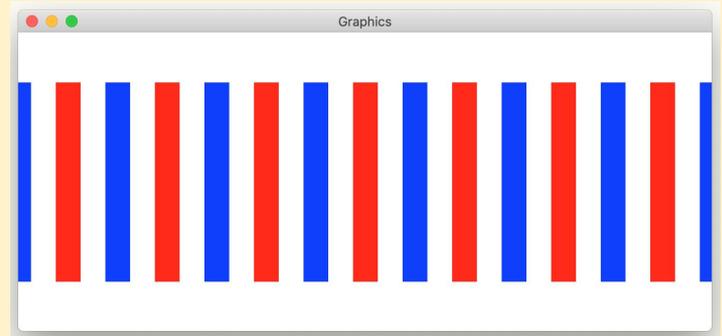
Make your program display a canvas like the one shown


```python
def main():
    gui = graphics(700, 300, 'Graphics')
    i = 0
    while i < 700:
        offset = i * 50
        if i % 2 == 0:
            gui.line(offset, 50, offset, 250, 'blue', 25)
        else:
            gui.line(offset, 50, offset, 250, 'red', 25)
        i += 1
    gui.draw()
```
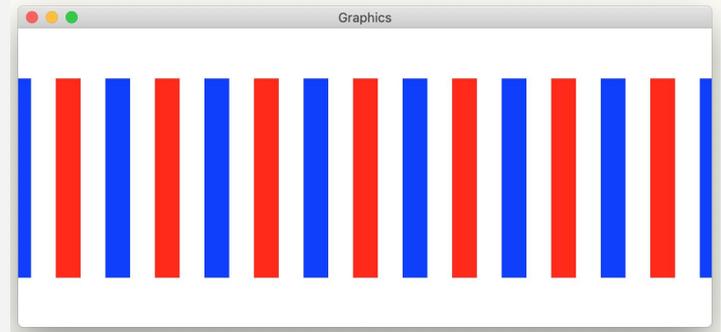
What should change to update the canvas?


```
def main():
    gui = graphics(700, 300, 'Graphics')
    i = 0
    while i < 700:
        offset = i * 50
        if i % 2 == 0:
            gui.line(offset, 50, offset, 250, 'blue', 25)
        else:
            gui.line(offset, 50, offset, 250, 'red', 25)
        i += 1
    gui.draw()
```
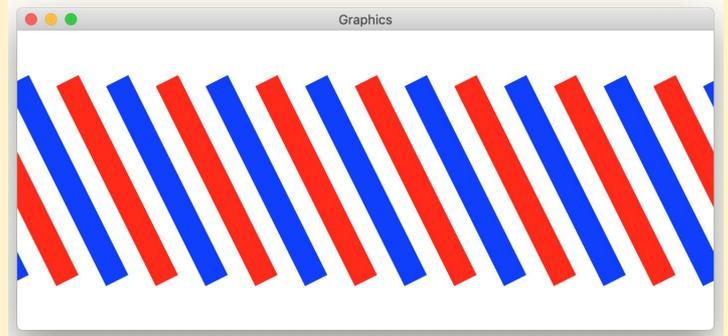
```python
def main():
    gui = graphics(700, 300, 'Graphics')
    i = -2
    while i < 700:
        Offs et = i * 50
        if i % 2 == 0:
            gui.line(offset, 50, offset+100, 250, 'blue', 25)
        else:
            gui.line(offset, 50, offset+100, 250, 'red', 25)
        i += 1
    gui.draw()
```
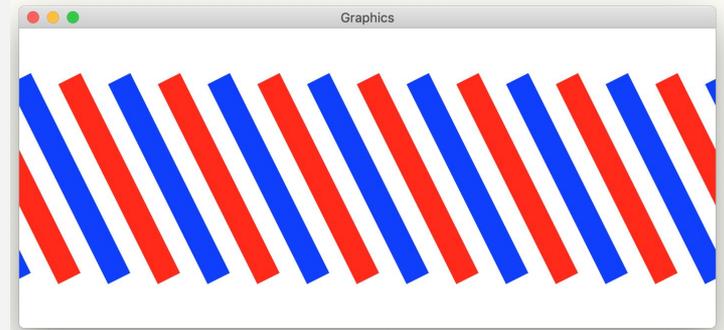
A Face


```python
from graphics import graphics

def main():
    gui = graphics(500, 500, 'Graphics')
    gui.ellipse(250, 250, 400, 400, 'dodger blue')
    gui.ellipse(150, 200, 50, 50, 'green')
    gui.ellipse(350, 200, 50, 50, 'green')
    gui.rectangle(150, 325, 200, 50, 'pale green')
    gui.draw()

main()
```
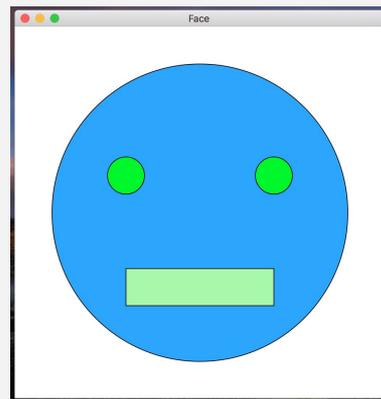
Give the face a nose


```python
def main():
    gui = graphics(500, 500, 'Graphics')
    gui.ellipse(250, 250, 400, 400, 'dodger blue')
    gui.ellipse(150, 200, 50, 50, 'green')
    gui.ellipse(350, 200, 50, 50, 'green')
    gui.rectangle(150, 325, 200, 50, 'pale green')
    # What would go here?
    gui.draw()
```
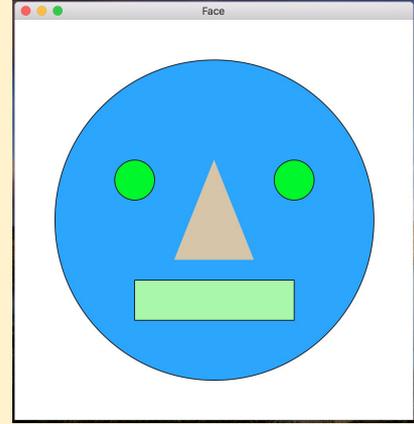
Draw This


```python
def main():
    gui = graphics(500, 500, 'Graphics')
    gui.ellipse(250, 250, 400, 400, 'dodger blue')
    gui.ellipse(150, 200, 50, 50, 'green')
    gui.ellipse(350, 200, 50, 50, 'green')
    gui.rectangle(150, 325, 200, 50, 'pale green')
    gui.triangle(250, 175, 200, 300, 300, 300, 'wheat3')
    gui.draw()
```
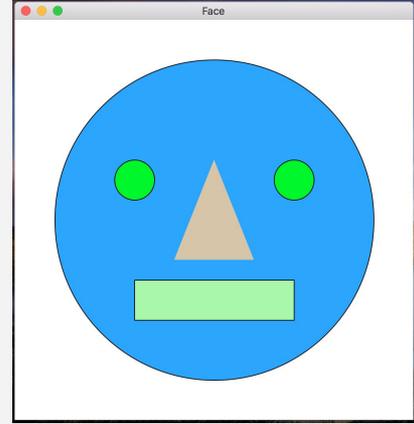
Draw This
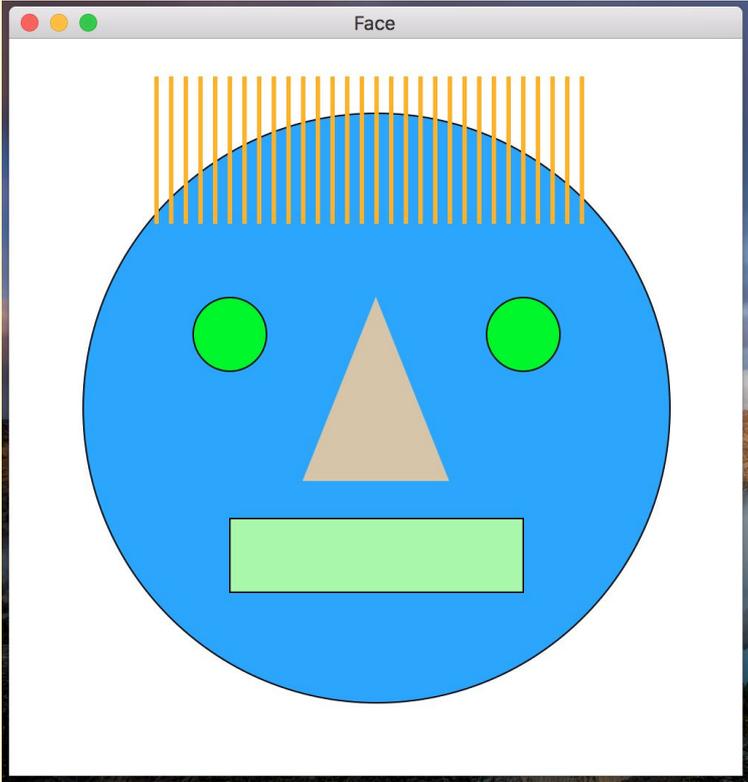
Draw This


```python
def main():
    gui = graphics(500, 500, 'Face')
    gui.ellipse(250, 250, 400, 400, 'dodger blue')
    gui.ellipse(150, 200, 50, 50, 'green')
    gui.ellipse(350, 200, 50, 50, 'green')
    gui.rectangle(150, 325, 200, 50, 'pale green')
    gui.triangle(250, 175, 200, 300, 300, 300, 'wheat3')
    # What would go here?
    gui.draw()
```
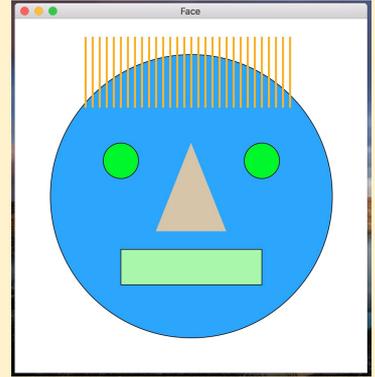
Draw This


```python
def main():
    gui = graphics(500, 500, 'Face')
    gui.ellipse(250, 250, 400, 400, 'dodger blue')
    gui.ellipse(150, 200, 50, 50, 'green')
    gui.ellipse(350, 200, 50, 50, 'green')
    gui.rectangle(150, 325, 200, 50, 'pale green')
    gui.triangle(250, 175, 200, 300, 300, 300, 'wheat3')
    i = 100
    while i < 400:
        gui.line(i, 25, i, 125, 'orange')
        i += 10
    gui.draw()
```
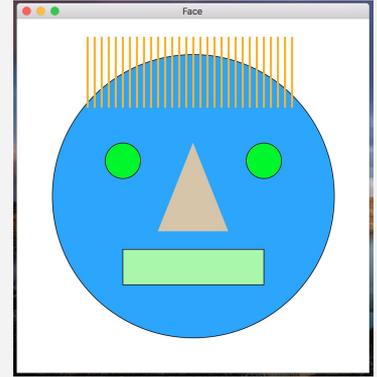
Draw This


```python
def main():
    gui = graphics(500, 500, 'Face')
    gui.ellipse(250, 250, 400, 400, 'dodger blue')
    gui.ellipse(150, 200, 50, 50, 'green')
    gui.ellipse(350, 200, 50, 50, 'green')
    gui.rectangle(150, 325, 200, 50, 'pale green')
    gui.triangle(250, 175, 200, 300, 300, 300, 'wheat3')
    i = 100
    while i < 400:
        gui.line(i, 25, i, 125, 'orange')
        i += 10
    # Add the code
    gui.draw()
```
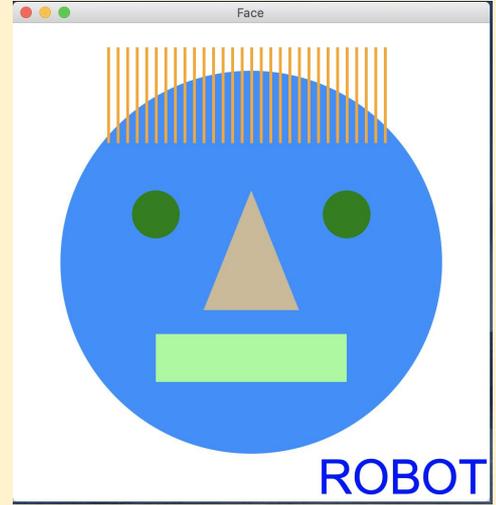
Draw This


```python
def main():
    gui = graphics(500, 500, 'Face')
    gui.ellipse(250, 250, 400, 400, 'dodger blue')
    gui.ellipse(150, 200, 50, 50, 'green')
    gui.ellipse(350, 200, 50, 50, 'green')
    gui.rectangle(150, 325, 200, 50, 'pale green')
    gui.triangle(250, 175, 200, 300, 300, 300, 'wheat3')
    i = 100
    while i < 400:
        gui.line(i, 25, i, 125, 'orange')
        i += 10
    gui.text(320, 445, 'ROBOT', 'blue', 50)
    gui.draw()
```