

# CS177 Python Programming

Recitation 3 - Objects and Graphics

# Announcements

- If you still did not register to **Piazza**, please send an e-mail to Ruby
- You *cannot* submit your lab after the lab is finished.
- Doing the Pre-labs before going to the lab is crucially important. Pre-labs touch the same concepts that we cover in the labs.
- Pre-labs are *not* graded.

# Outline

- Importing a library
- Simple Graphics Programming
- Changing the coordinate system
- Common mistakes


# Importing a library

There are 3 ways of importing a library/module.

- `>> import math`
- `>> from math import factorial`
- `>> from math import *`

# Importing a library


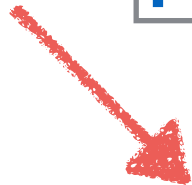
There are 3 ways of importing a library/module.

- `>> import math` 
- `>> from math import factorial`
- `>> from math import *`

<code>math.factorial(5)</code>	<b>YES</b>
<code>math.pi</code>	<b>YES</b>
<code>factorial(5)</code>	<b>NO</b>
<code>pi</code>	<b>NO</b>

# Importing a library

There are 3 ways of importing a library/module.

- `>> import math` 
- `>> from math import factorial`
- `>> from math import *` 


<code>math.factorial(5)</code>	<b>YES</b>
<code>math.pi</code>	<b>YES</b>
<code>factorial(5)</code>	<b>NO</b>
<code>pi</code>	<b>NO</b>

<code>math.factorial(5)</code>	<b>NO</b>
<code>math.pi</code>	<b>NO</b>
<code>factorial(5)</code>	<b>YES</b>
<code>pi</code>	<b>NO</b>

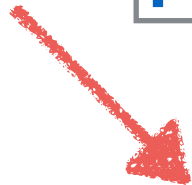
# Importing a library

There are 3 ways of importing a library/module.


- >> import math
- >> from math import factorial
- >> from math import \*



<b>math.factorial(5)</b>	<b>YES</b>
<b>math.pi</b>	<b>YES</b>
<b>factorial(5)</b>	<b>NO</b>
<b>pi</b>	<b>NO</b>



<b>math.factorial(5)</b>	<b>NO</b>
<b>math.pi</b>	<b>NO</b>
<b>factorial(5)</b>	<b>YES</b>
<b>pi</b>	<b>NO</b>



<b>math.factorial(5)</b>	<b>NO</b>
<b>math.pi</b>	<b>NO</b>
<b>factorial(5)</b>	<b>YES</b>
<b>pi</b>	<b>YES</b>

# Simple Graphics Programming

```
from graphics import *  
win = GraphWin("My Window", 200, 400)  
win.getMouse()
```



# Simple Graphics Programming

```
from graphics import *  
win = GraphWin("My Window", 200, 400)  
win.getMouse()
```

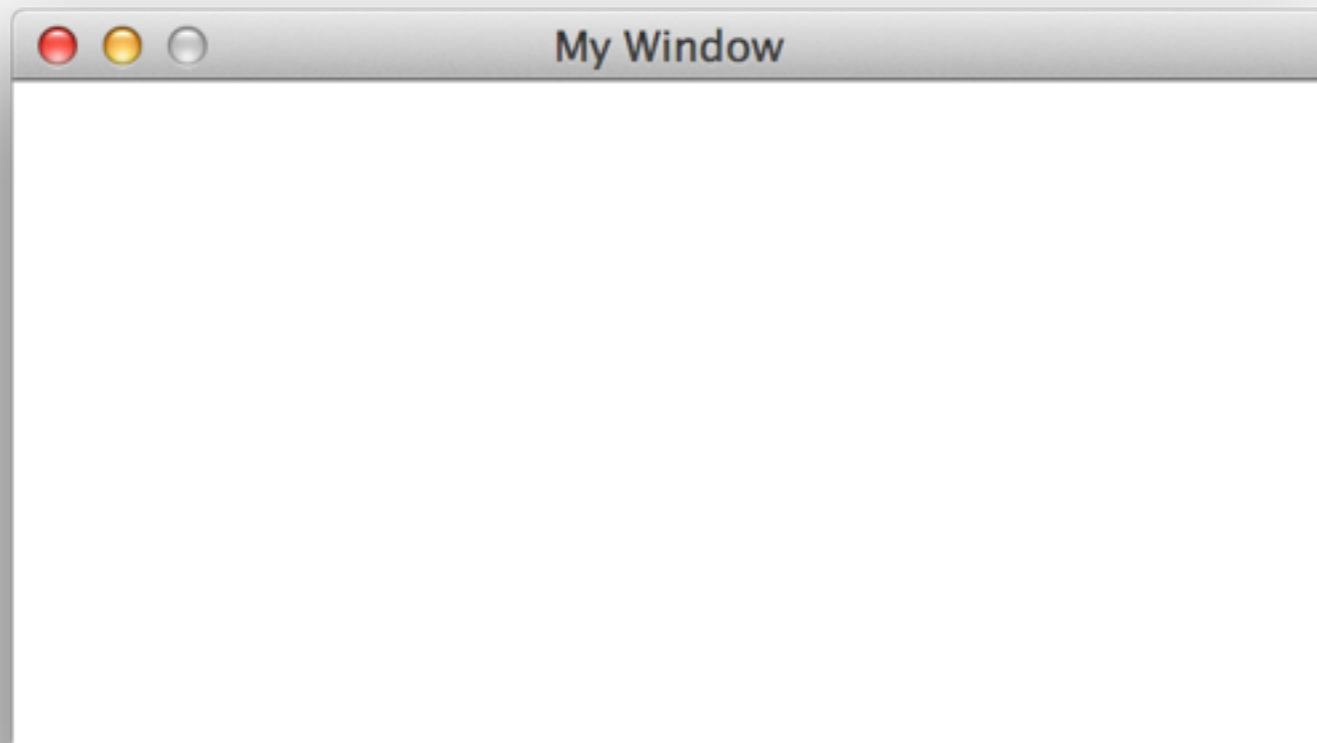


# Simple Graphics Programming

```
from graphics import *  
win = GraphWin("My Window", 400, 200)  
win.getMouse()
```

# Simple Graphics Programming

```
from graphics import *  
win = GraphWin("My Window", 400, 200)  
win.getMouse()
```



# Simple Graphics Programming

```
from graphics import *
```

```
win = GraphWin("My Window", 200, 200)
```

```
p1 = Point(50,60)
```

```
p2 = Point(100,100)
```

```
p3 = Point(150,150)
```

```
p4 = Point(200,200)
```

```
p1.draw(win)
```

```
p2.draw(win)
```

```
p3.draw(win)
```

```
p4.draw(win)
```

```
win.getMouse()
```

# Simple Graphics Programming

```
from graphics import *
```

```
win = GraphWin("My Window", 200, 200)
```

```
p1 = Point(50,60)
```

```
p2 = Point(100,100)
```

```
p3 = Point(150,150)
```

```
p4 = Point(200,200)
```

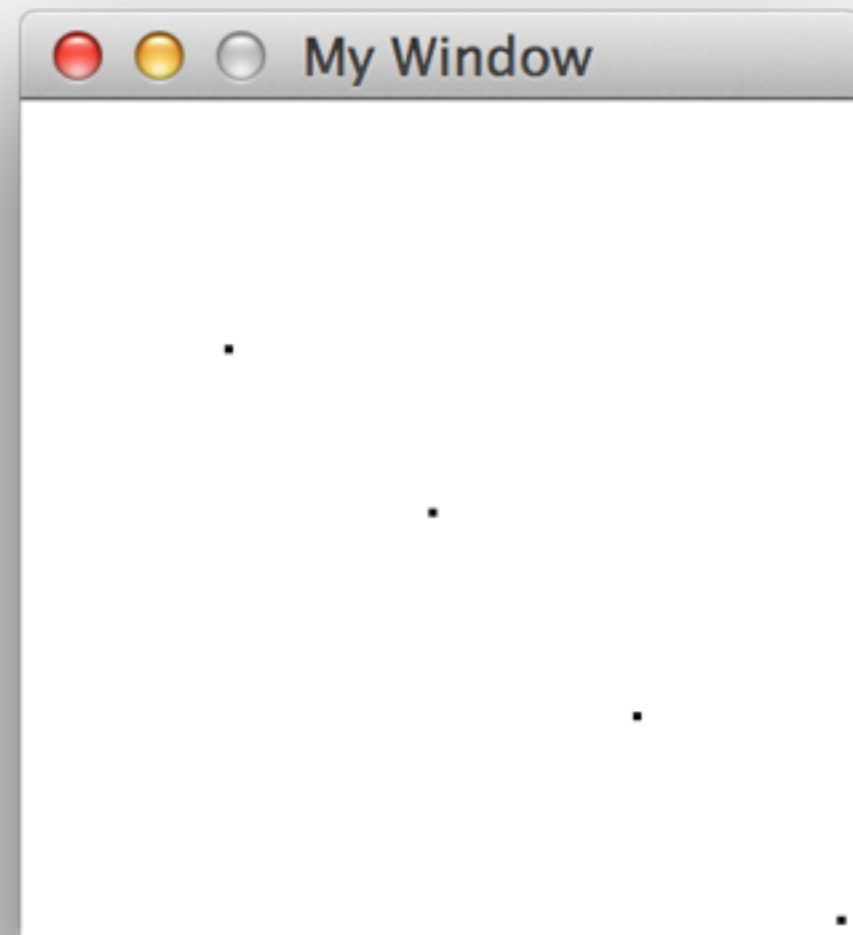
```
p1.draw(win)
```

```
p2.draw(win)
```

```
p3.draw(win)
```

```
p4.draw(win)
```

```
win.getMouse()
```



# Simple Graphics Programming

```
from graphics import *
```

```
win = GraphWin("My Window", 200, 200)
```

```
p1 = Point(50,60)
```

```
p2 = Point(100,100)
```

```
p3 = Point(150,150)
```

```
p4 = Point(200,200)
```

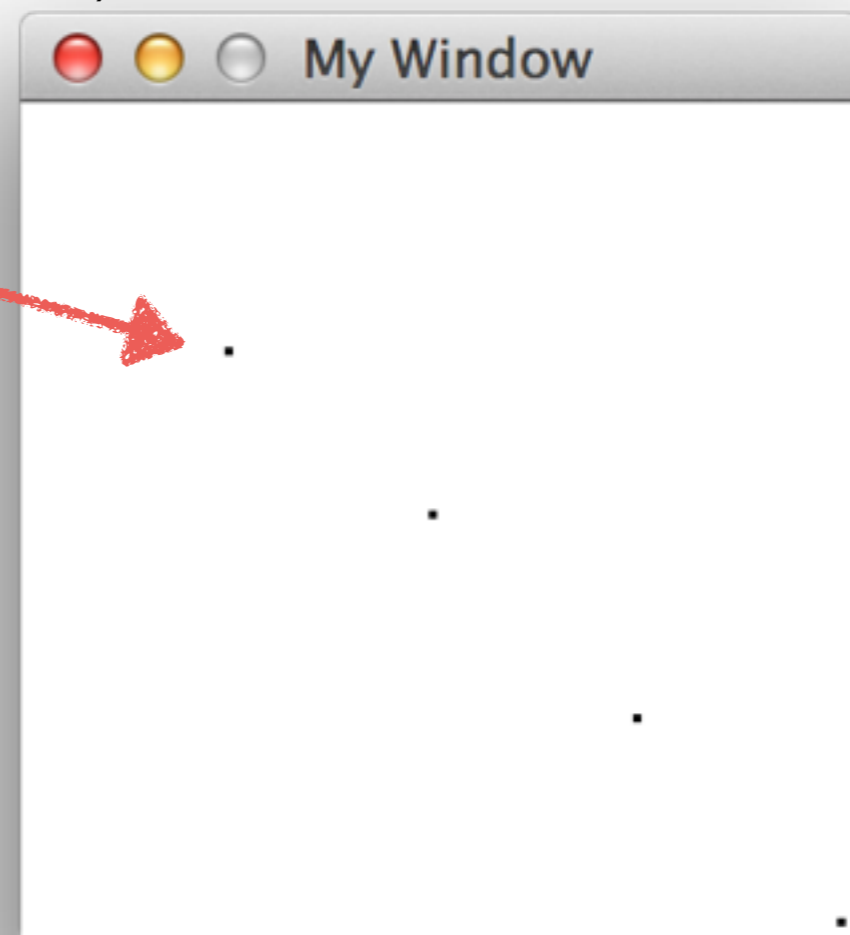
```
p1.draw(win)
```

```
p2.draw(win)
```

```
p3.draw(win)
```

```
p4.draw(win)
```

```
win.getMouse()
```



# Simple Graphics Programming

```
from graphics import *
```

```
win = GraphWin("My Window", 200, 200)
```

```
p1 = Point(50,60)
```

```
p2 = Point(100,100)
```

```
p3 = Point(150,150)
```

```
p4 = Point(200,200)
```

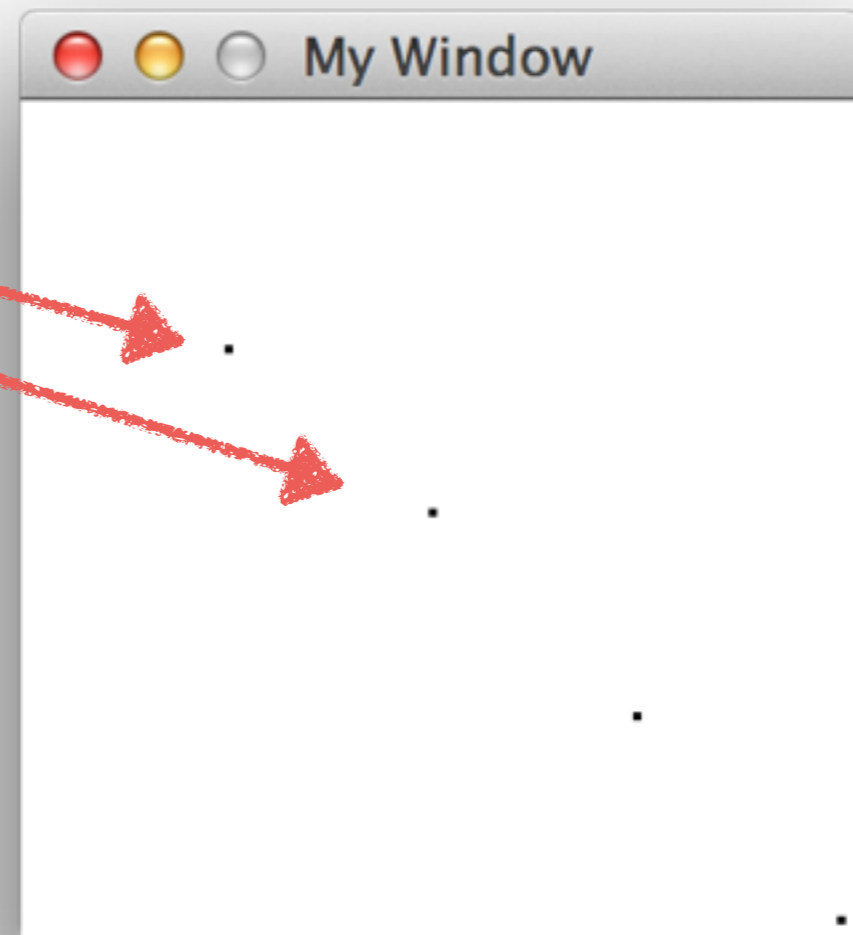
```
p1.draw(win)
```

```
p2.draw(win)
```

```
p3.draw(win)
```

```
p4.draw(win)
```

```
win.getMouse()
```



# Simple Graphics Programming

```
from graphics import *
```

```
win = GraphWin("My Window", 200, 200)
```

```
p1 = Point(50,60)
```

```
p2 = Point(100,100)
```

```
p3 = Point(150,150)
```

```
p4 = Point(200,200)
```

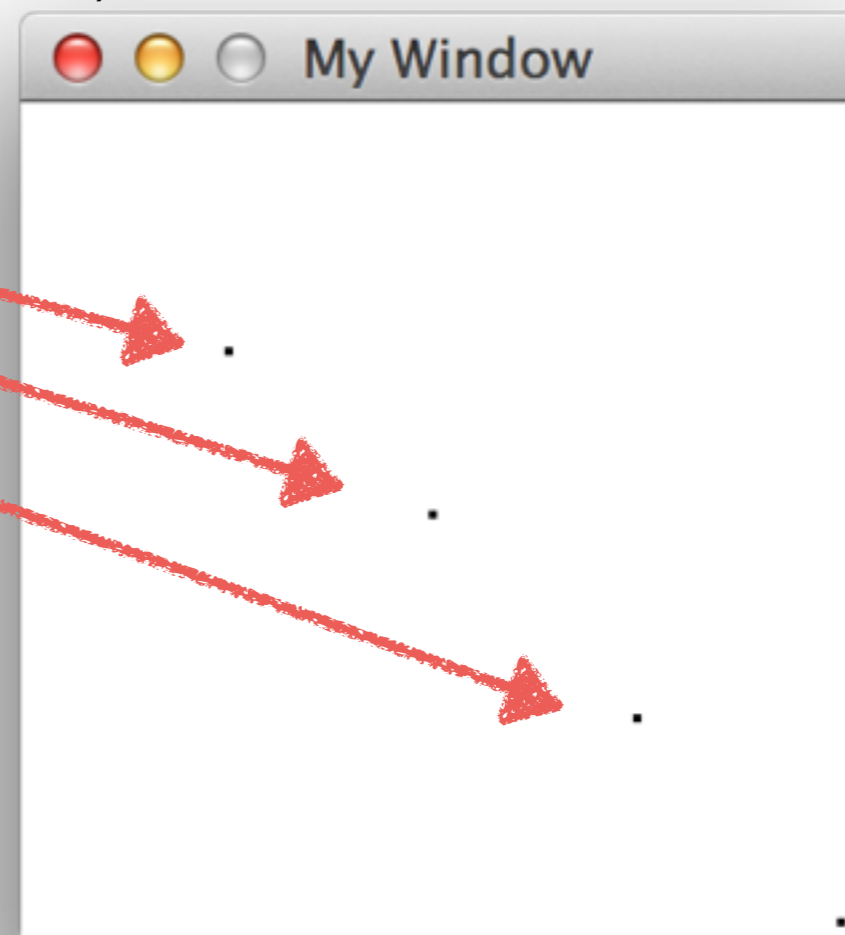
```
p1.draw(win)
```

```
p2.draw(win)
```

```
p3.draw(win)
```

```
p4.draw(win)
```

```
win.getMouse()
```





# Simple Graphics Programming

```
from graphics import *
```

```
win = GraphWin("My Window", 200, 200)
```

```
p1 = Point(50,60)
```

```
p2 = Point(100,100)
```

```
p3 = Point(150,150)
```

```
p4 = Point(200,200)
```

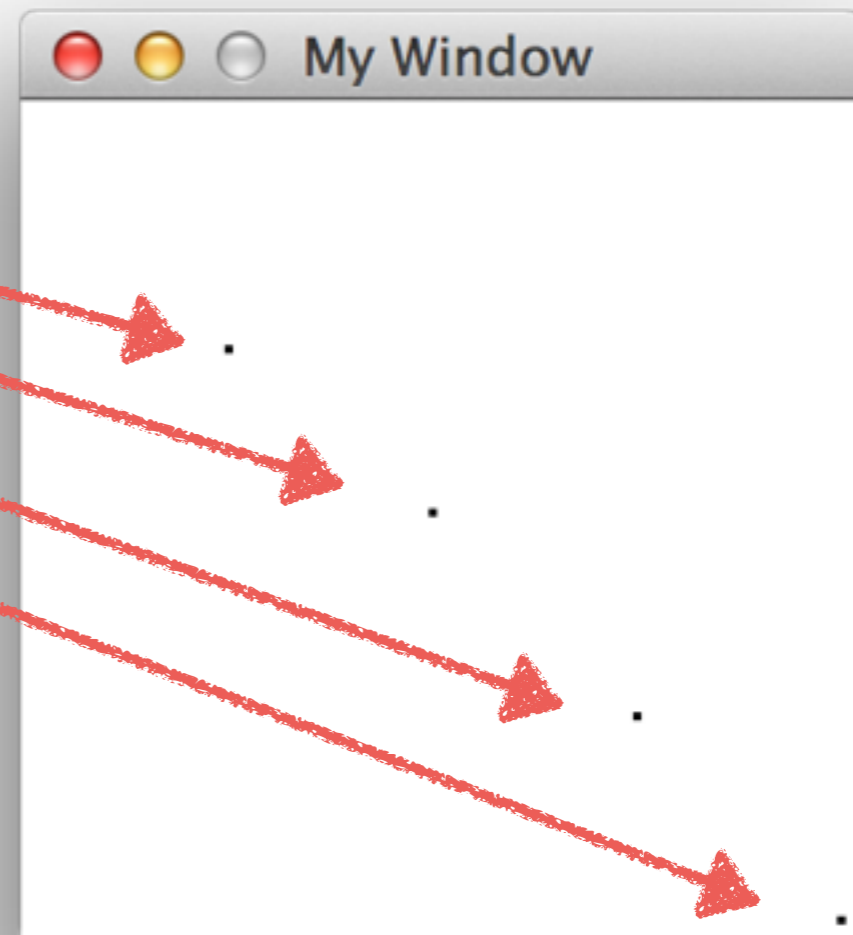
```
p1.draw(win)
```

```
p2.draw(win)
```

```
p3.draw(win)
```

```
p4.draw(win)
```

```
win.getMouse()
```



# Simple Graphics Programming

from g **What is the coordinates of this point?**

```
win = GraphWin("My Window", 200, 200)
```

```
p1 = Point(50,60)
```

```
p2 = Point(100,100)
```

```
p3 = Point(150,150)
```

```
p4 = Point(200,200)
```

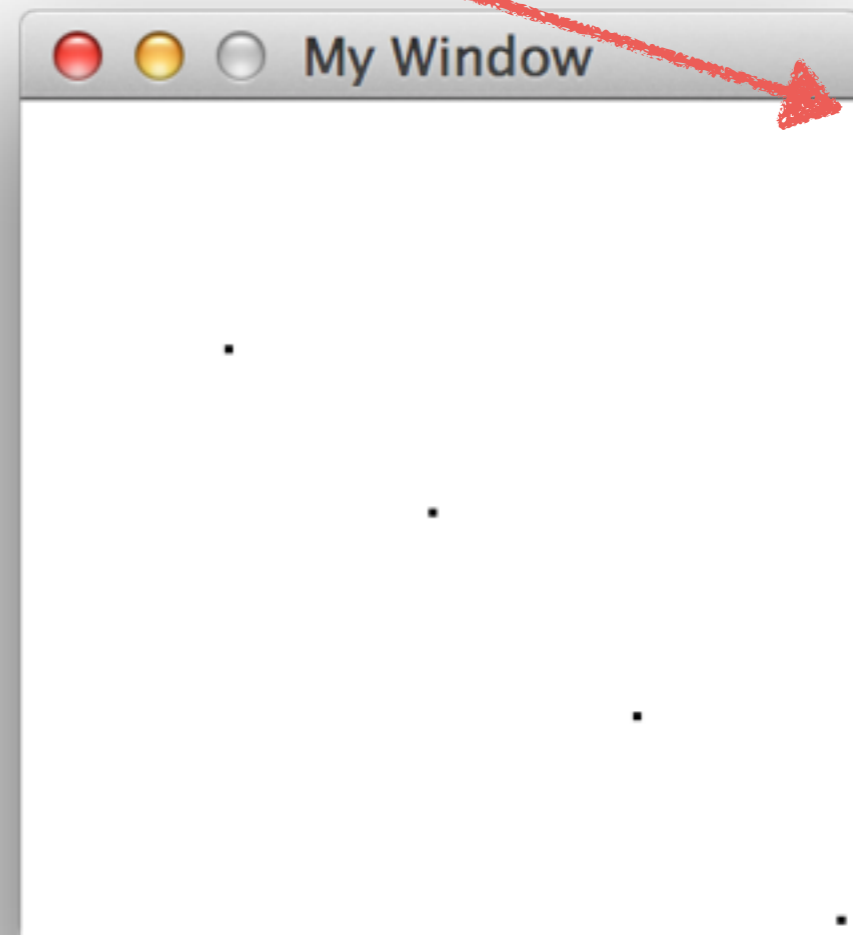
```
p1.draw(win)
```

```
p2.draw(win)
```

```
p3.draw(win)
```

```
p4.draw(win)
```

```
win.getMouse()
```



# Simple Graphics Programming

from g **What is the coordinates of this point?**

```
win = GraphWin("My Window", 200, 200)
```

```
p1 = Point(50,60)
```

```
p2 = Point(100,100)
```

```
p3 = Point(150,150)
```

```
p4 = Point(200,200)
```

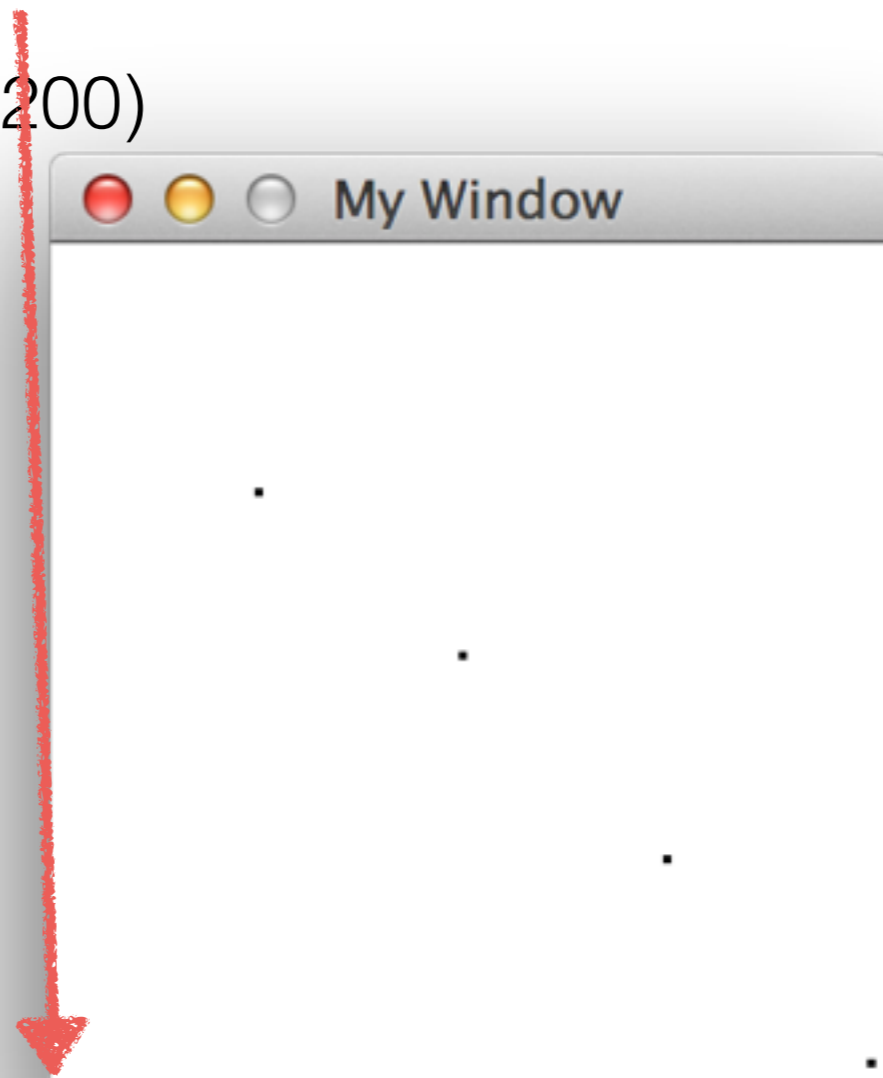
```
p1.draw(win)
```

```
p2.draw(win)
```

```
p3.draw(win)
```

```
p4.draw(win)
```

```
win.getMouse()
```



# Simple Graphics Programming

```
from graphics import *
```

```
def main():
```

```
    win = GraphWin("My Window", 500, 500)
```

```
    c = Circle(Point(250,250), 200)
```

```
    c.draw(win)
```

```
    win.getMouse() # pause for click in window
```

```
    win.close()
```

```
main()
```

# Simple Graphics Programming

```
from graphics import
```

```
def main():
```

```
    win = GraphWin("M
```

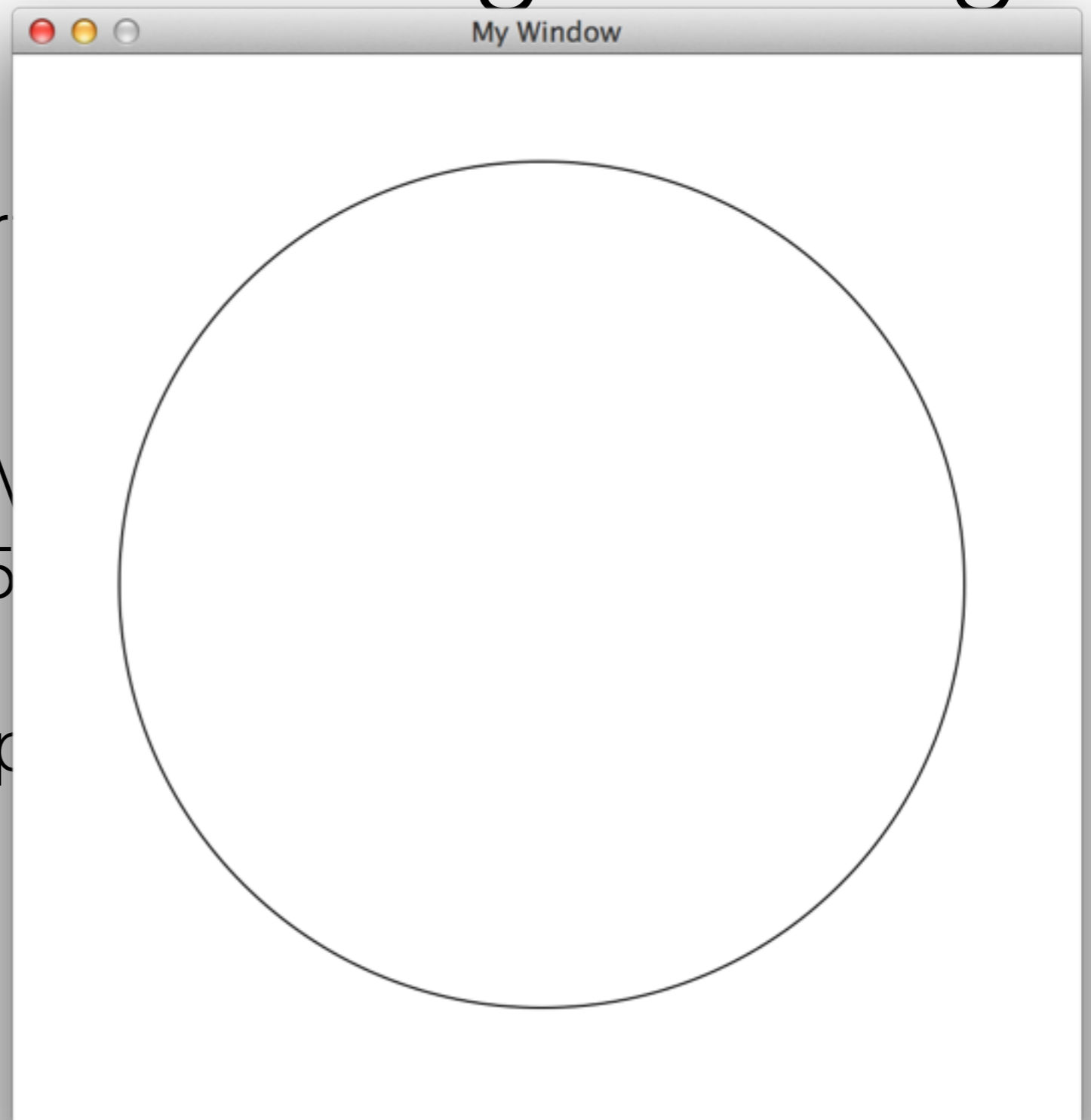
```
    c = Circle(Point(25
```

```
    c.draw(win)
```

```
    win.getMouse() # p
```

```
    win.close()
```

```
main()
```



# Simple Graphics Programming

```
from graphics import *
```

```
def main():
```

```
    win = GraphWin("My Window", 500, 500)
```

```
    c = Circle(Point(250,250), 200)
```

```
    c.draw(win)
```

```
    win.getMouse() # pause for click in window
```

```
    win.close()
```

```
main()
```

# Simple Graphics Programming

Creates the window



```
from graphics import *
```

```
def main():
```

```
    win = GraphWin("My Window", 500, 500)
```

```
    c = Circle(Point(250,250), 200)
```

```
    c.draw(win)
```

```
    win.getMouse() # pause for click in window
```

```
    win.close()
```

```
main()
```

# Simple Graphics Programming

```
from graphics import *
```

```
def main():
```

```
    win = GraphWin("My Window", 500, 500)
```

```
    c = Circle(Point(250,250), 200)
```

```
    c.draw(win)
```

```
    win.getMouse() # pause for click in window
```

```
    win.close()
```

```
main()
```

Creates the window



Creates a  
circle object





# Simple Graphics Programming

```
from graphics import *
```

```
def main():
```

```
    win = GraphWin("My Window", 500, 500)
```

```
    c = Circle(Point(250,250), 200)
```

```
    c.draw(win)
```

```
    win.getMouse() # pause for click in window
```

```
    win.close()
```

```
main()
```

Creates the window

Creates a  
circle object

Draws the circle on window

# Simple Graphics Programming

```
from graphics import *
```

```
def main():
```

```
    win = GraphWin("My Window", 500, 500)
```

```
    c = Circle(Point(250,250), 200)
```

```
    c.draw(win)
```

```
    win.getMouse() # pause for click in window
```

```
    win.close()
```

```
main()
```

Creates the window

Creates a  
circle object

Draws the circle on window

To prevent the window  
to close immediately

# Simple Graphics Programming

```
from graphics import *
```

```
def main():
```

```
    win = GraphWin("My Window", 500, 500)
```

```
    c = Circle(Point(100, 100), 200)
```

```
    c.draw(win)
```

```
    win.getMouse() # pause for click in window
```

```
    win.close()
```

```
main()
```

# Simple Graphics Programming

```
from graphics import *
```

```
def main():
```

```
    win = GraphWin("My Window", 500, 500)
```

```
    c = Circle(Point(100, 100), 200) Change
```

```
    c.draw(win)
```

```
    win.getMouse() # pause for click in window
```

```
    win.close()
```

```
main()
```

# Simple Graphics Programming

```
from graphics import *
```

```
def main():
```

```
    win = GraphWin("My Window", 500, 500)
```

```
    c = Circle(Point(100, 100), 200) Change
```

```
    c.draw(win)
```

```
    win.getMouse() # pause for click in window
```

```
    win.close()
```

```
main()
```

Draw your expected output  
on a piece of paper!

# Simple Graphics Programming

```
from graphics import *
```

```
def main():
```

```
    win = GraphWin("My Window")
```

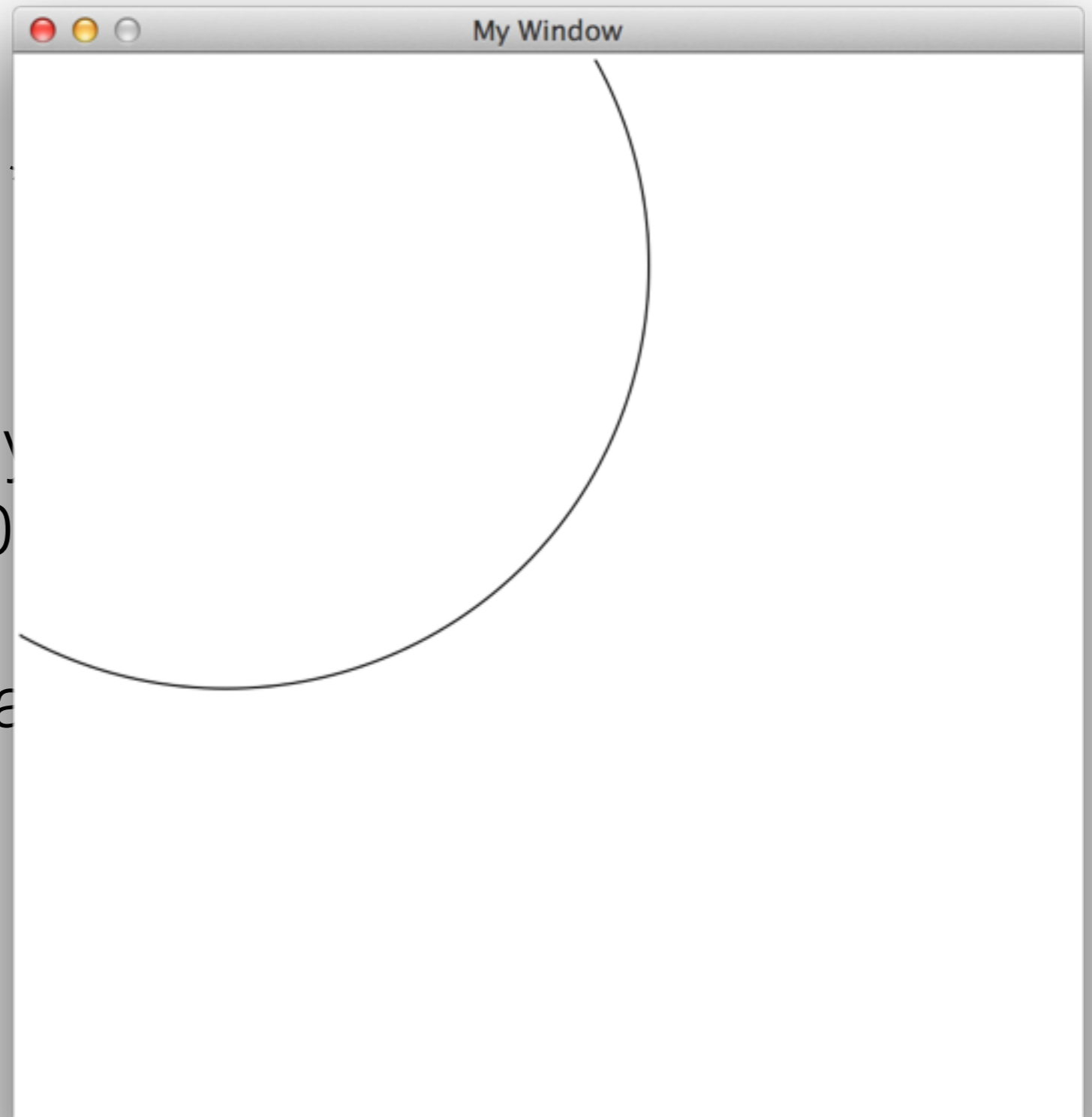
```
    c = Circle(Point(100, 100))
```

```
    c.draw(win)
```

```
    win.getMouse() # pause for click
```

```
    win.close()
```

```
main()
```



# Simple Graphics Programming

```
from graphics import *
```

```
def main():
```

```
    win = GraphWin("My Window", 500, 500)
```

```
    c = Circle(Point(100,100), 100)
```

```
    c.draw(win)
```

```
    win.getMouse() # pause for click in window
```

```
    win.close()
```

```
main()
```

# Simple Graphics Programming

```
from graphics import *
```

```
def main():
```

```
    win = GraphWin("My Window", 500, 500)
```

```
    c = Circle(Point(100, 100), 100) Change
```

```
    c.draw(win)
```

```
    win.getMouse() # pause for click in window
```

```
    win.close()
```

```
main()
```



# Simple Graphics Programming

```
from graphics import *
```

```
def main():
```

```
    win = GraphWin("My Window", 500, 500)
```

```
    c = Circle(Point(100,100), 100) Change
```

```
    c.draw(win)
```

```
    win.getMouse() # pause for click in window
```

```
    win.close()
```

```
main()
```

Draw your expected output  
on a piece of paper!

# Simple Graphics Programming

```
from graphics import
```

```
def main():
```

```
    win = GraphWin("M
```

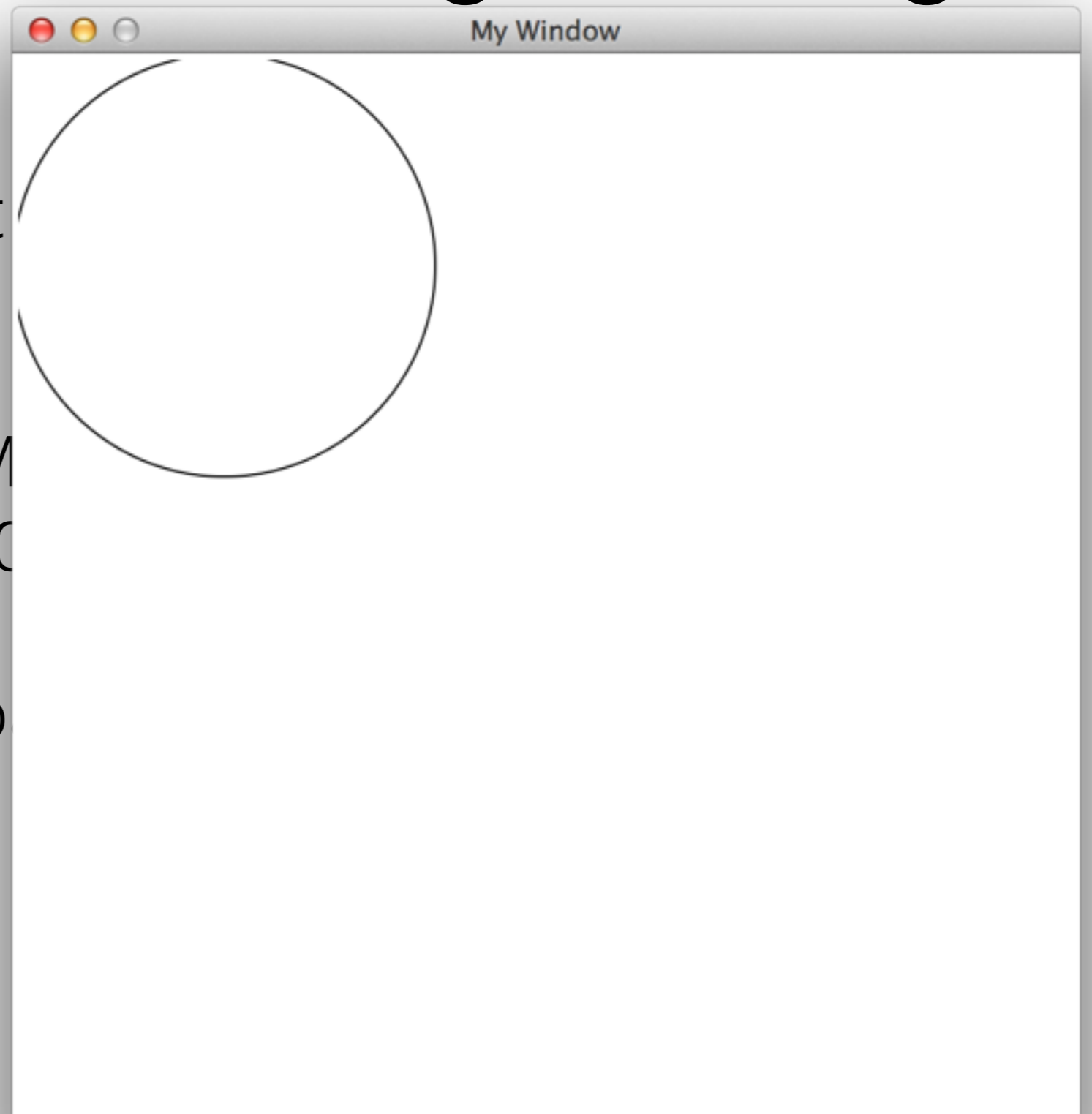
```
    c = Circle(Point(100
```

```
    c.draw(win)
```

```
    win.getMouse() # p
```

```
    win.close()
```

```
main()
```



# Some graphic functions

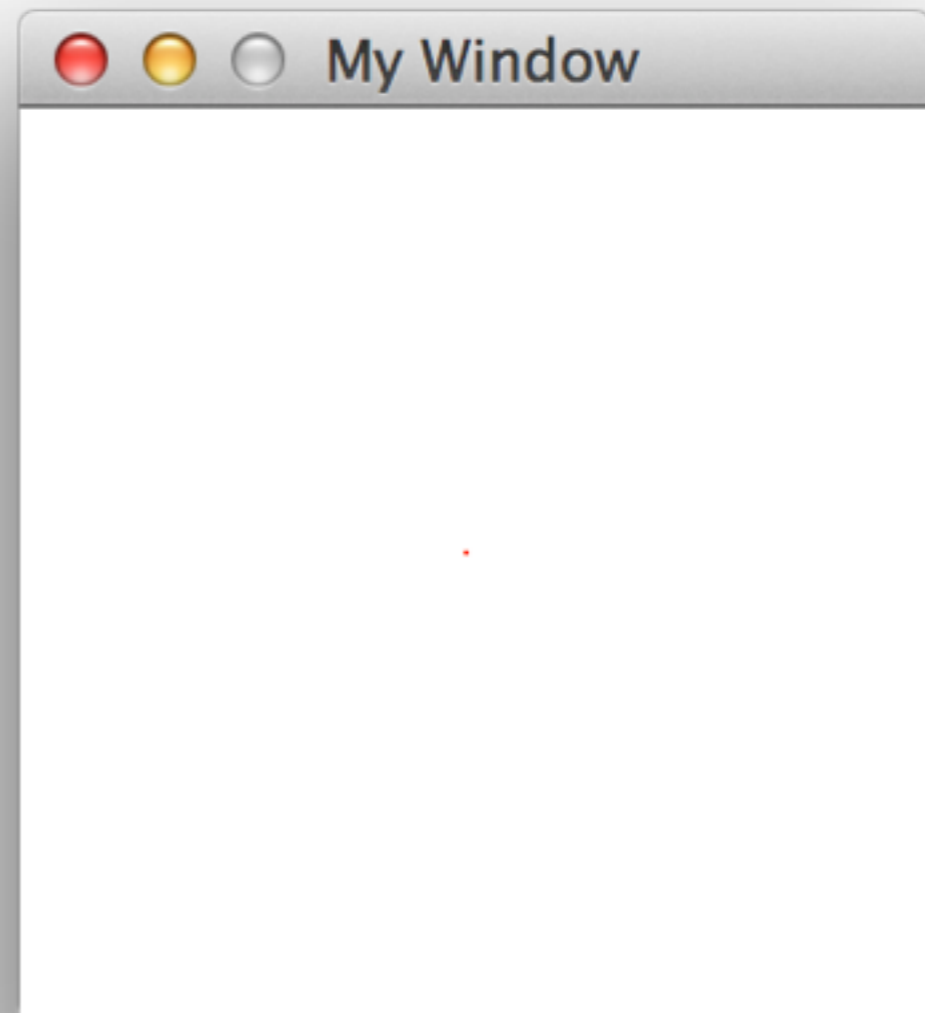
- `plot(x, y, color)` Draws the pixel at (x, y) in the window. Color is optional, black is the default
- `setBackground(color)` Sets the window background to the given color. The initial background is gray
- `close()` Closes the on-screen window
- `getMouse()` Pauses for the user to click a mouse in the window and returns where the mouse was clicked as a Point object

# plot(x, y, color)

```
from graphics import *  
win = GraphWin("My Window", 200, 200)  
win.plot(100, 100, 'red')  
win.getMouse()
```

# plot(x, y, color)

```
from graphics import *  
win = GraphWin("My Window", 200, 200)  
win.plot(100, 100, 'red')  
win.getMouse()
```



```
plot(x, y, color)
```

```
from graphics import *
```

```
win = GraphWin("My Window", 200, 200)
```

```
for i in range(80, 120):  
    win.plot(i, 100, 'red')
```

```
win.getMouse()
```

```
plot(x, y, color)
```

```
from graphics import *
```

```
win = GraphWin("My Window", 200, 200)
```

```
for i in range(80, 120):  
    win.plot(i, 100, 'red')
```

```
win.getMouse()
```

Draw your expected output  
on a piece of paper!

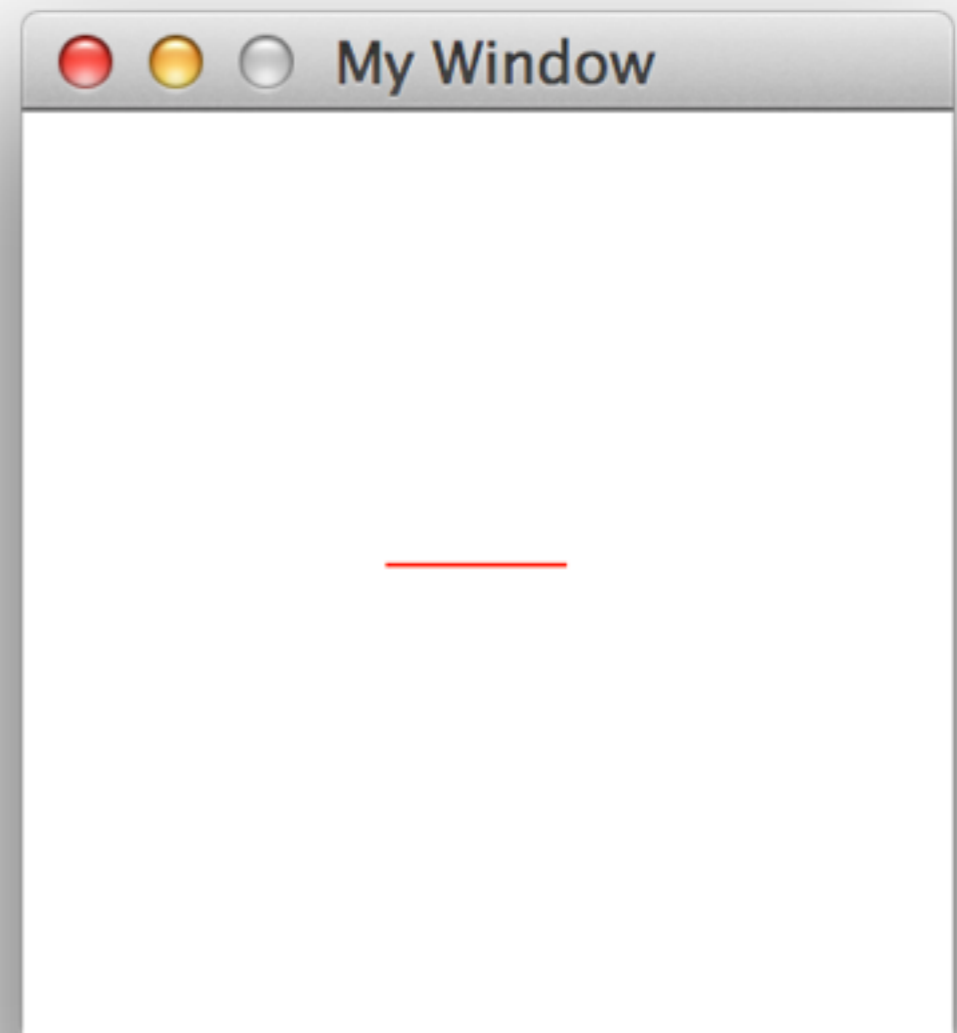
# plot(x, y, color)

```
from graphics import *
```

```
win = GraphWin("My Window", 200, 200)
```

```
for i in range(80, 120):  
    win.plot(i, 100, 'red')
```

```
win.getMouse()
```





# setBackground(color)

```
from graphics import *
```

```
win = GraphWin("My Window", 200, 200)
```

```
win.setBackground('yellow')
```

```
for i in range(80, 120):  
    win.plot(50, i, 'black')
```

```
win.getMouse()
```

# setBackground(color)

```
from graphics import *
```

```
win = GraphWin("My Window", 200, 200)
```

```
win.setBackground('yellow')
```

```
for i in range(80, 120):  
    win.plot(50, i, 'black')
```

```
win.getMouse()
```

Draw your expected  
output on a  
piece of paper!

# setBackground(color)

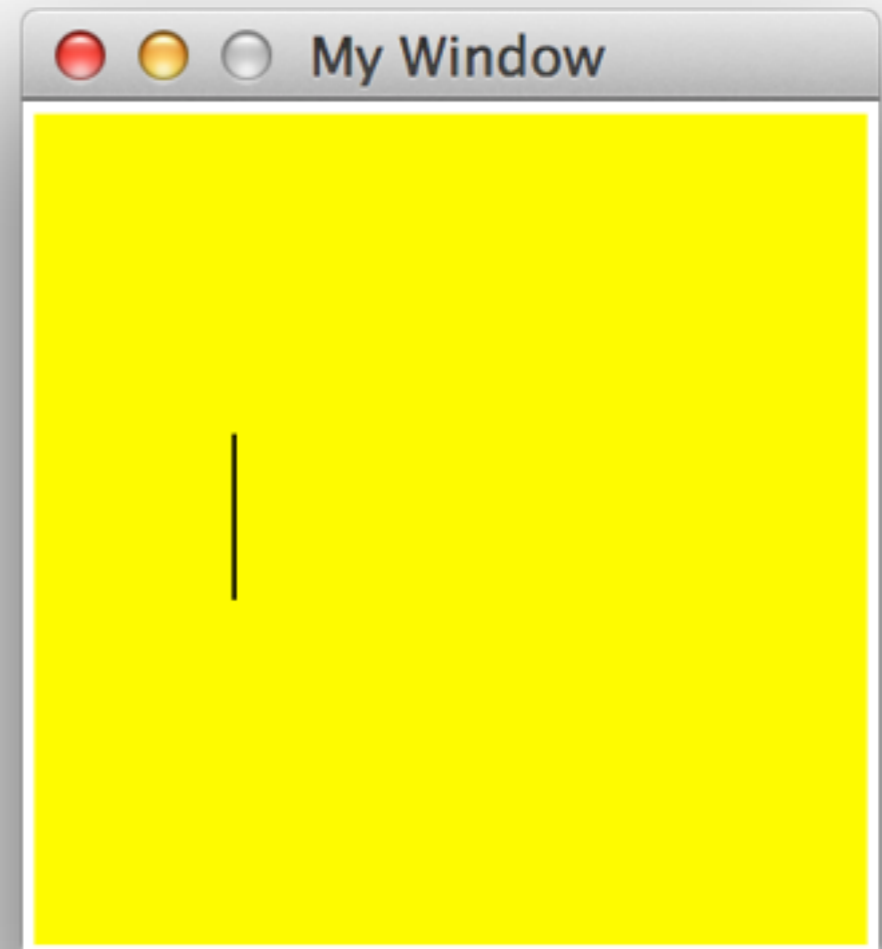
```
from graphics import *
```

```
win = GraphWin("My Window", 200, 200)
```

```
win.setBackground('yellow')
```

```
for i in range(80, 120):  
    win.plot(50, i, 'black')
```

```
win.getMouse()
```



# Some graphic functions (contd.)

## Circle methods:

- `Circle(centerPoint, radius)` Constructs a circle with given center point and radius
- `getCenter()` Returns a clone of the center point of the circle
- `getRadius()` Returns the radius of the circle

# Some graphic functions (contd.)

## Rectangle Methods:

- `Rectangle(point1, point2)` Constructs a rectangle having opposite corners at point1 and point2
- `getCenter()` Returns a clone of the center point of the rectangle

# Rectangle(point1, point2)

```
from graphics import *
```

```
win = GraphWin("My Window", 200, 200)  
rect = Rectangle(Point(50,50), Point(150,150))
```

```
rect.draw(win)
```

```
centerPoint = rect.getCenter()  
print(centerPoint.getX())  
print(centerPoint.getY())
```

```
win.getMouse()
```

# Rectangle(point1, point2)

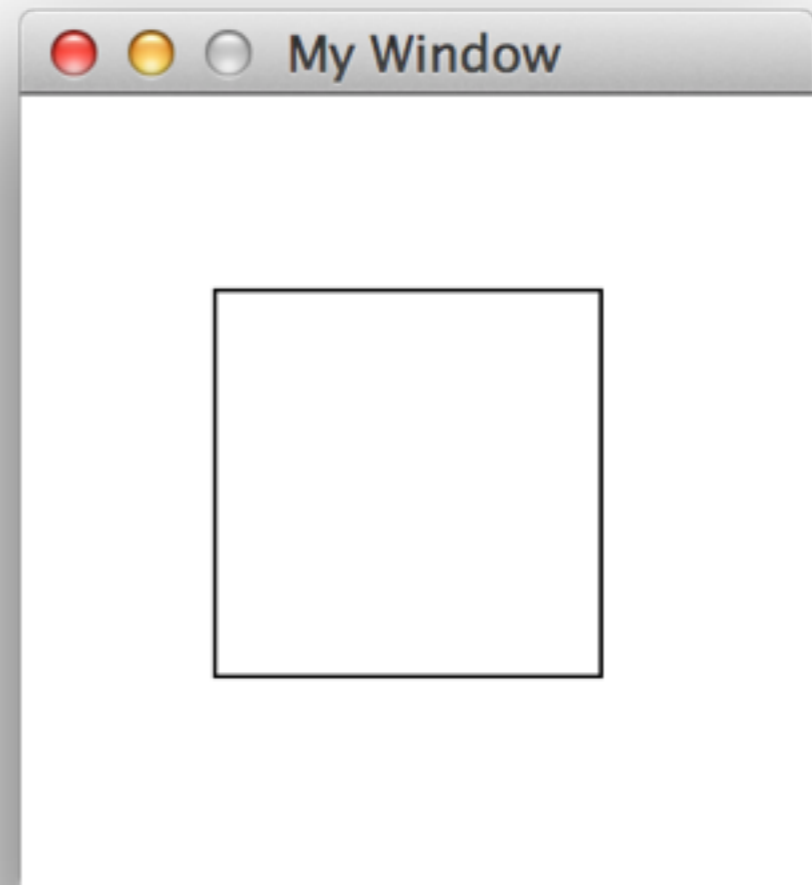
```
from graphics import *
```

```
win = GraphWin("My Window", 200, 200)  
rect = Rectangle(Point(50,50), Point(150,150))
```

```
rect.draw(win)
```

```
centerPoint = rect.getCenter()  
print(centerPoint.getX())  
print(centerPoint.getY())
```

```
win.getMouse()
```



# Rectangle(point1, point2)

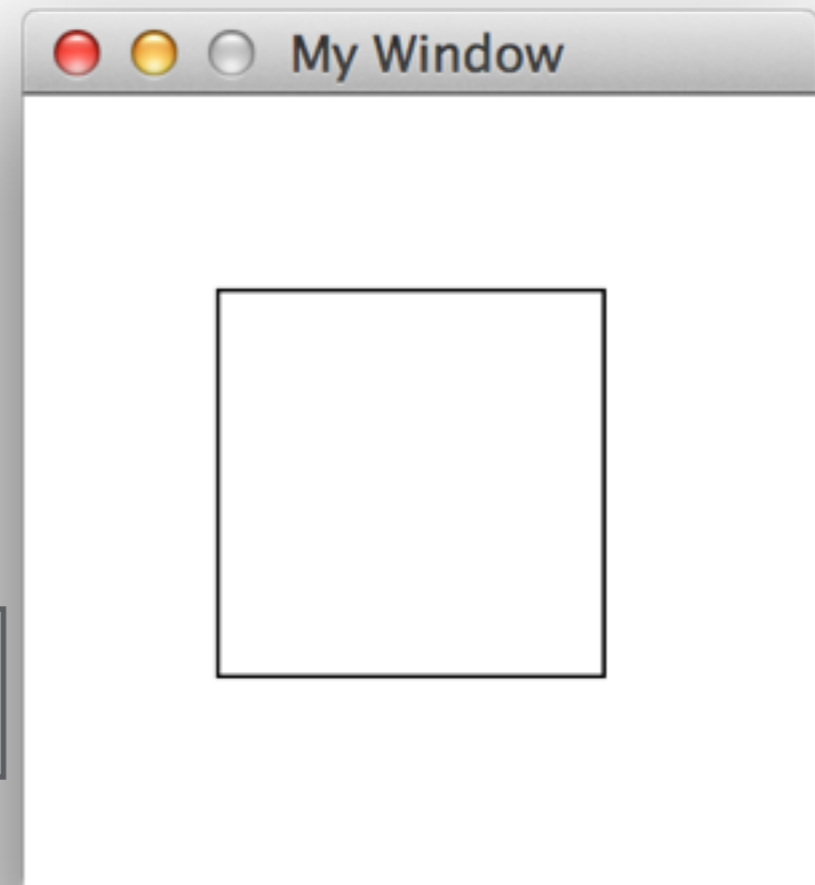
```
from graphics import *
```

```
win = GraphWin("My Window", 200, 200)  
rect = Rectangle(Point(50,50), Point(150,150))
```

```
rect.draw(win)
```

```
centerPoint = rect.getCenter()  
print(centerPoint.getX())  
print(centerPoint.getY())
```

```
win.getMouse() Prints what?
```





# Rectangle(point1, point2)

```
from graphics import *
```

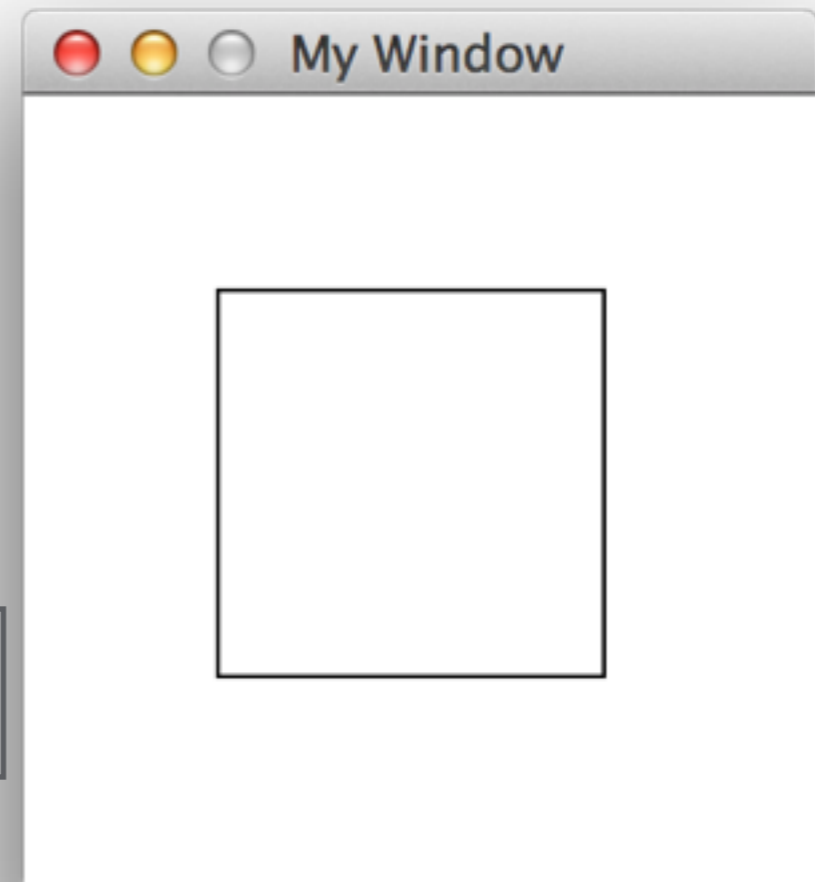
```
100.0  
100.0  
█
```

```
win = GraphWin("My Window", 200, 200)  
rect = Rectangle(Point(50,50), Point(150,150))
```

```
rect.draw(win)
```

```
centerPoint = rect.getCenter()  
print(centerPoint.getX())  
print(centerPoint.getY())
```

```
win.getMouse() Prints what?
```



# Line(point1, point2)

```
from graphics import *
```

```
win = GraphWin("My Window", 200, 200)
```

```
line = Line(Point(25,25), Point(175,175))
```

```
line.draw(win)
```

```
win.getMouse()
```

# Line(point1, point2)

```
from graphics import *
```

```
win = GraphWin("My Window", 200, 200)
```

```
line = Line(Point(25,25), Point(175,175))
```

```
line.draw(win)
```

```
win.getMouse()
```

Draw your expected  
output on a  
piece of paper!

# Line(point1, point2)

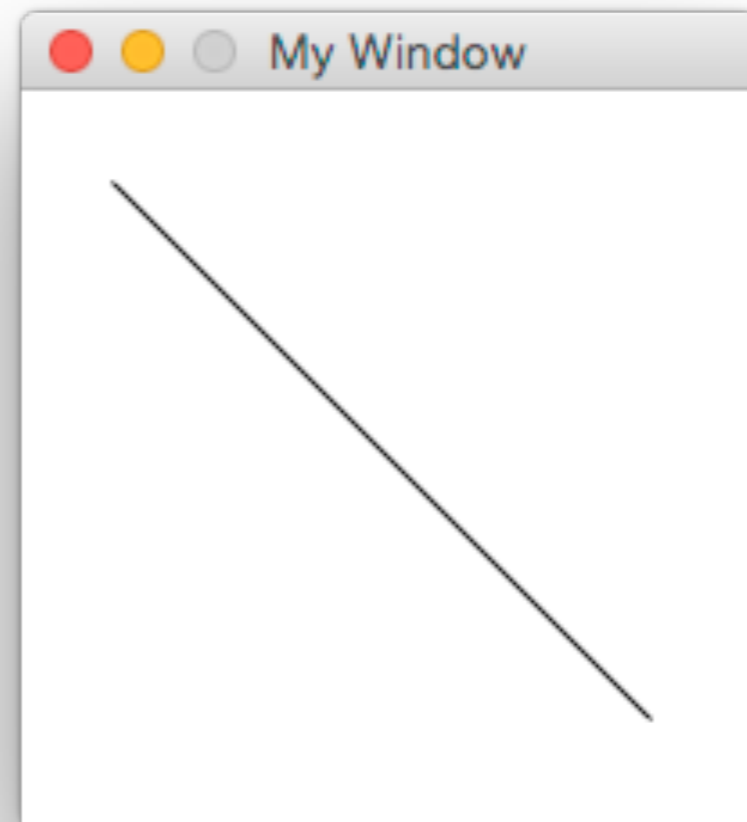
```
from graphics import *
```

```
win = GraphWin("My Window", 200, 200)
```

```
line = Line(Point(25,25), Point(175,175))
```

```
line.draw(win)
```

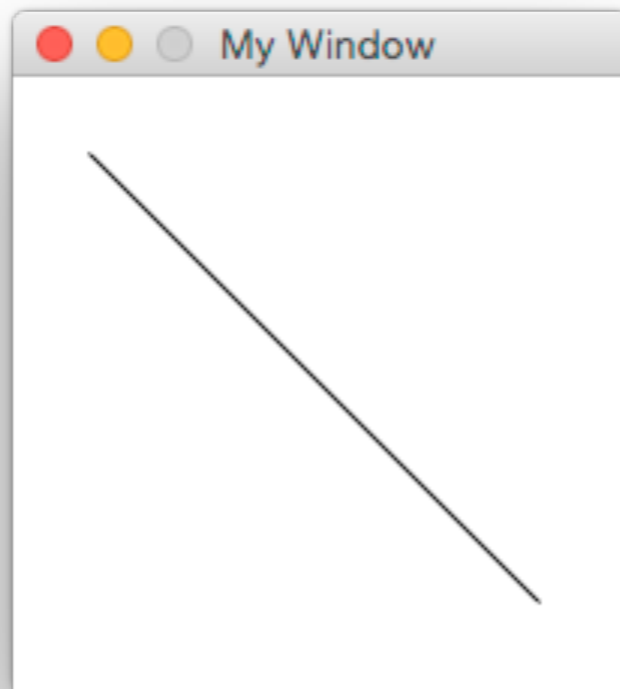
```
win.getMouse()
```



# Line(point1,

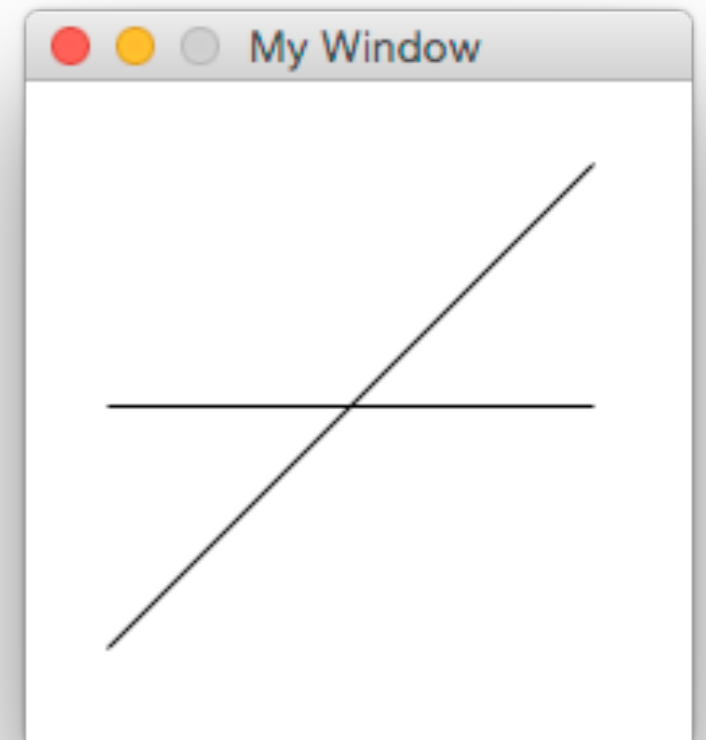
## How to draw this?

```
from graphics import *  
win = GraphWin("My Window", 200, 200)  
line = Line(Point(25,25), Point(175,175))  
line.draw(win)  
win.getMouse()
```



What are the values:  
a,b,c,d  
i,j,k,l  
???

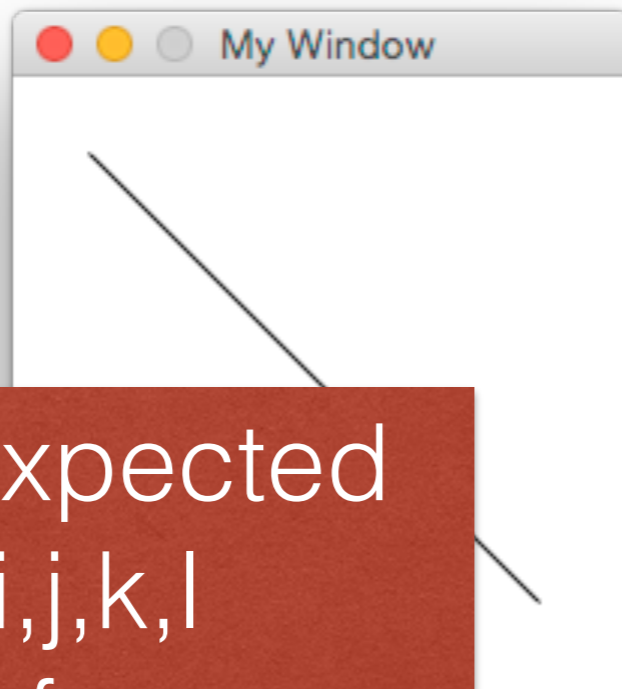
```
from graphics import *  
win = GraphWin("My Window", 200, 200)  
line1 = Line(Point(a, b), Point(c, d))  
line2 = Line(Point(i, j), Point(k,l))  
line1.draw(win)  
line2.draw(win)  
win.getMouse()
```



# Line(point1,

## How to draw this?

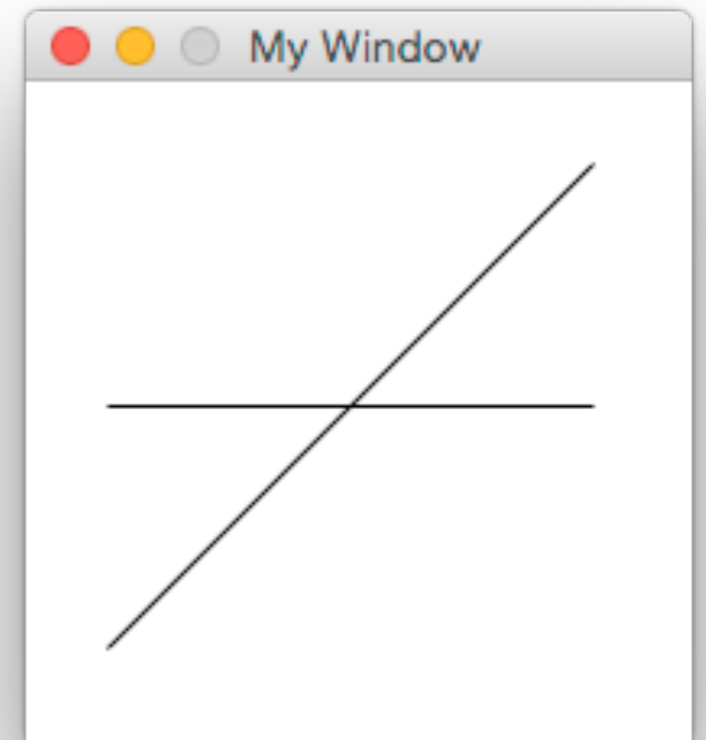
```
from graphics import *  
win = GraphWin("My Window", 200, 200)  
line = Line(Point(25,25), Point(175,175))  
line.draw(win)  
win.getMouse()
```



Write your expected  
a,b,c,d,i,j,k,l  
on a piece of paper.

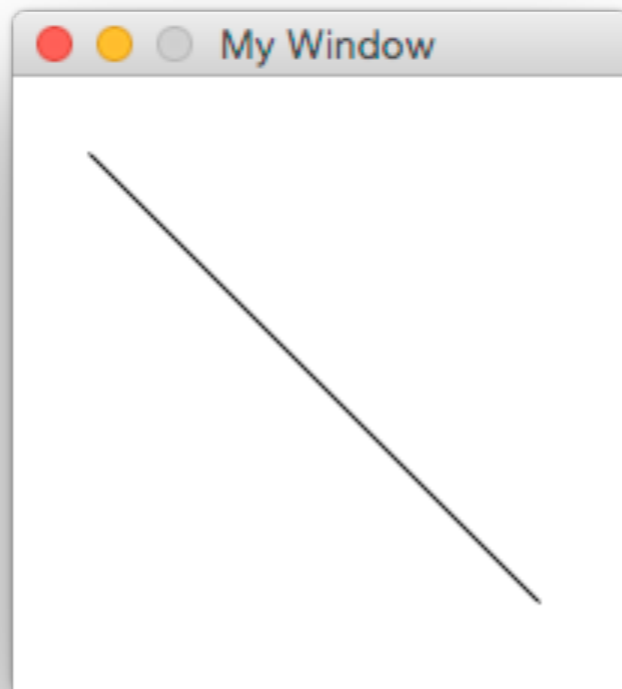
What are the values:  
a,b,c,d  
i,j,k,l  
???

```
from graphics import *  
win = GraphWin("My Window", 200, 200)  
line1 = Line(Point(a, b), Point(c, d))  
line2 = Line(Point(i, j), Point(k,l))  
line1.draw(win)  
line2.draw(win)  
win.getMouse()
```

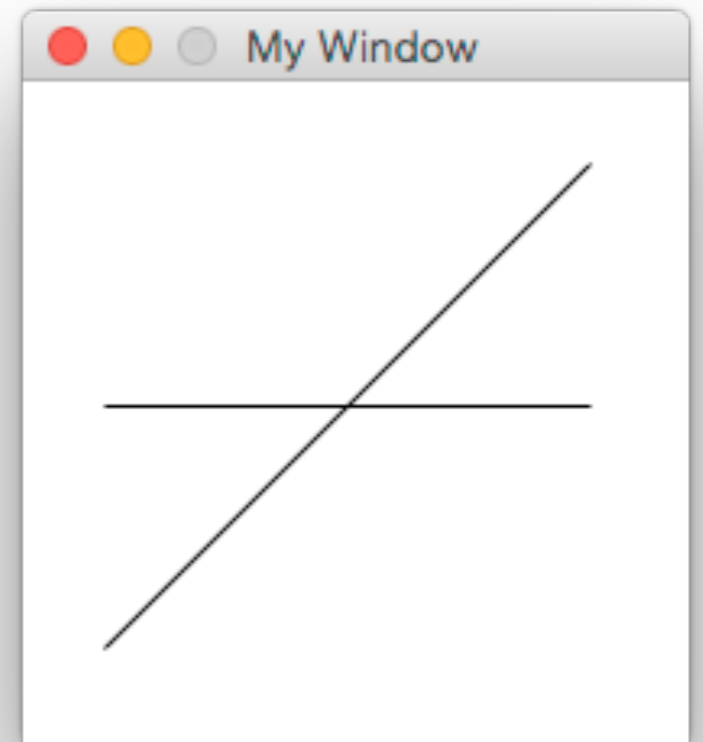


# Line(point1, point2)

```
from graphics import *  
win = GraphWin("My Window", 200, 200)  
line = Line(Point(25,25), Point(175,175))  
line.draw(win)  
win.getMouse()
```



```
from graphics import *  
win = GraphWin("My Window", 200, 200)  
line1 = Line(Point(25, 175), Point(175,25))  
line2 = Line(Point(25, 100), Point(175,100))  
line1.draw(win)  
line2.draw(win)  
win.getMouse()
```



# Line(point1, point2)

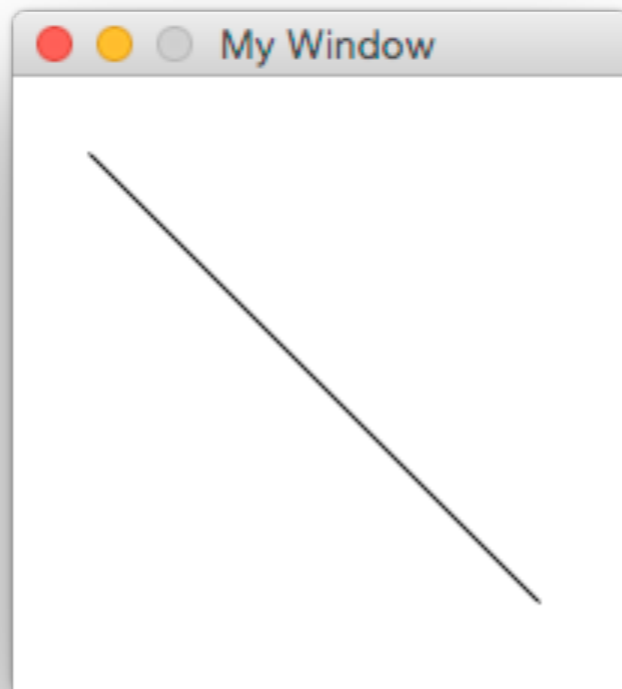
```
from graphics import *
```

```
win = GraphWin("My Window", 200, 200)
```

```
line = Line(Point(25,25), Point(175,175))
```

```
line.draw(win)
```

```
win.getMouse()
```



```
from graphics import *
```

```
win = GraphWin("My Window", 200, 200)
```

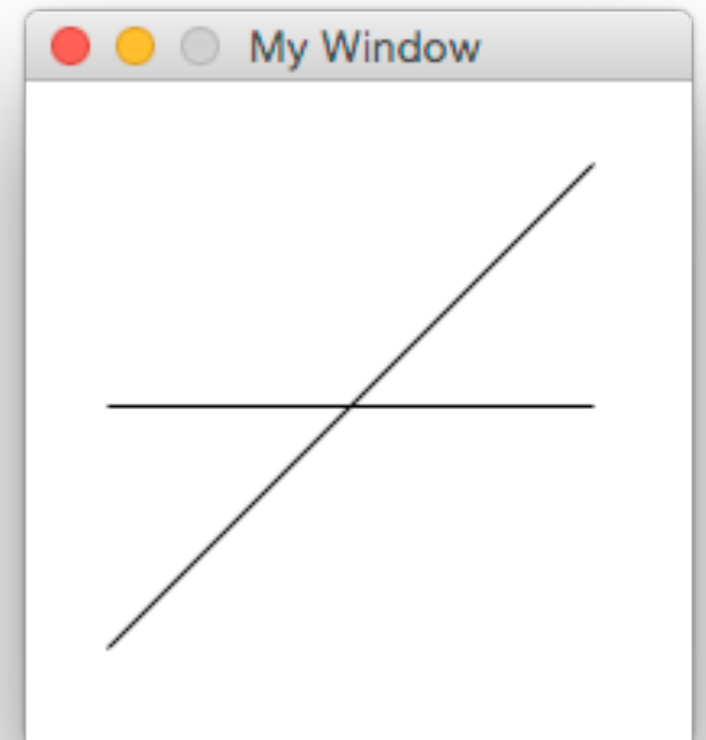
```
line1 = Line(Point(25, 175), Point(175,25))
```

```
line2 = Line(Point(25, 100), Point(175,100))
```

```
line1.draw(win)
```

```
line2.draw(win)
```

```
win.getMouse()
```





# Line(point1, point2)

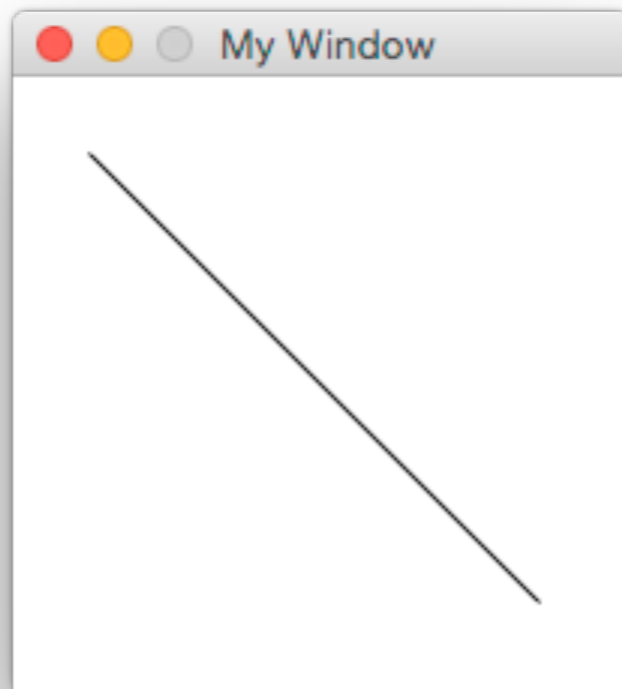
```
from graphics import *
```

```
win = GraphWin("My Window", 200, 200)
```

```
line = Line(Point(25,25), Point(175,175))
```

```
line.draw(win)
```

```
win.getMouse()
```



```
from graphics import *
```

```
win = GraphWin("My Window", 200, 200)
```

```
line2 = Line(Point(25, 100), Point(175,100))
```

```
line1 = Line(Point(25, 175), Point(175,25))
```

```
line1.draw(win)
```

```
line2.draw(win)
```

```
win.getMouse()
```

**Swapping lines  
change anything?**

# Line(point1, point2)

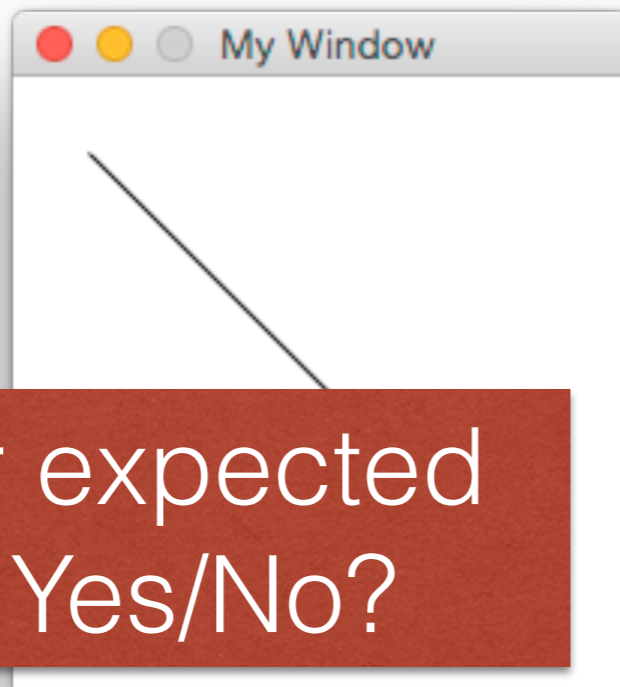
```
from graphics import *
```

```
win = GraphWin("My Window", 200, 200)
```

```
line = Line(Point(25,25), Point(175,175))
```

```
line.draw(win)
```

```
win.getMouse()
```



Write your expected answer. Yes/No?

```
from graphics import *
```

```
win = GraphWin("My Window", 200, 200)
```

```
line2 = Line(Point(25, 100), Point(175,100))
```

```
line1 = Line(Point(25, 175), Point(175,25))
```

```
line1.draw(win)
```

```
line2.draw(win)
```

```
win.getMouse()
```

**Swapping lines  
change anything?**

# Swapping lines change anything?

## Line(point1, point2)

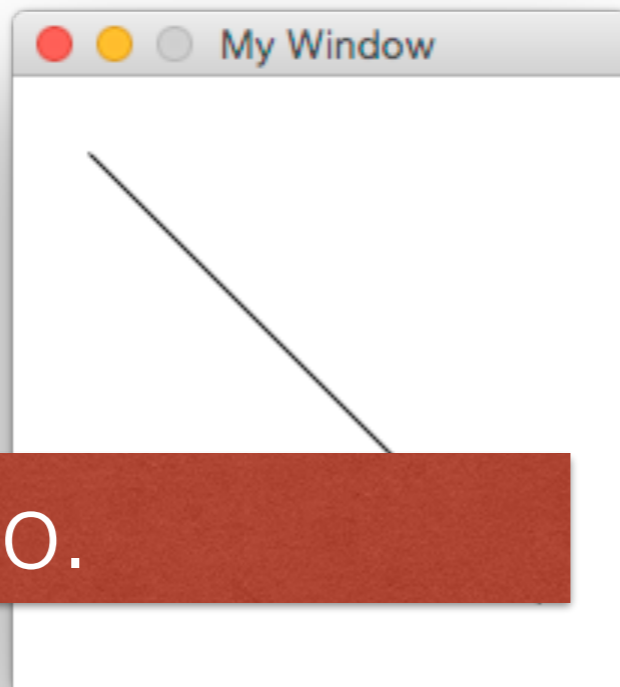
```
from graphics import *
```

```
win = GraphWin("My Window", 200, 200)
```

```
line = Line(Point(25,25), Point(175,175))
```

```
line.draw(win)
```

```
win.getMouse()
```



No.

```
from graphics import *
```

```
win = GraphWin("My Window", 200, 200)
```

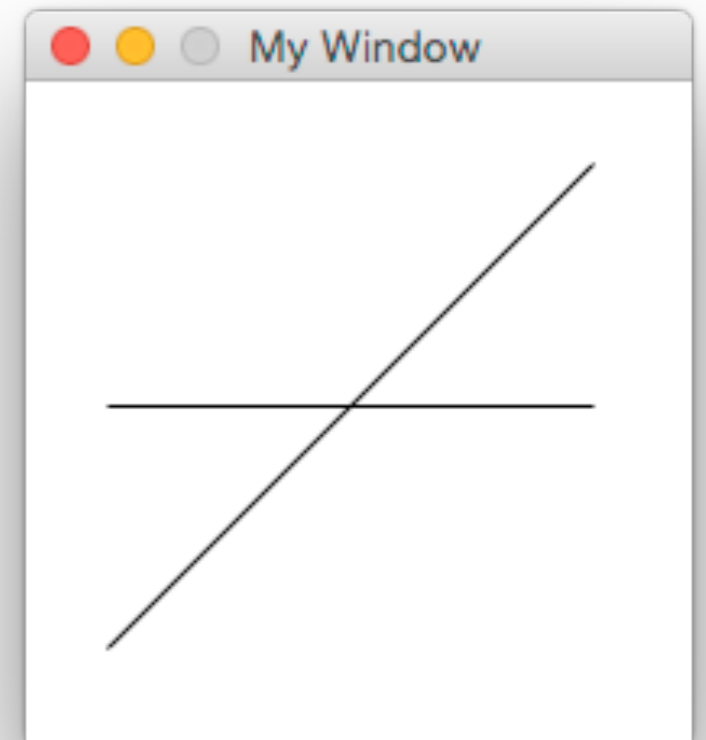
```
line1 = Line(Point(25, 175), Point(175,25))
```

```
line2 = Line(Point(25, 100), Point(175,100))
```

```
line1.draw(win)
```

```
line2.draw(win)
```

```
win.getMouse()
```



# Changing the coordinate system

```
from graphics import *                                # setCoords(xll, yll, xur, yur)

win = GraphWin("My Window", 200, 200)              # xll: x lower left
                                                    # yll: y lower left
                                                    # xur: x upper right
                                                    # yur: y upper right

# win.setCoords(0, 0 , 200, 200)

rect = Rectangle(Point(25,25), Point(75,75))
rect.draw(win)

win.getMouse()
```

# Changing the coordinate system

Sets the coordinate system of the window. The lower-left corner is  $(x_{ll}, y_{ll})$  and the upper-right corner is  $(x_{ur}, y_{ur})$ .

All subsequent drawing will be done with respect to the altered coordinate system (except for `plotPixel`).

```
# setCoords(xll, yll, xur, yur)
```

```
# xll: x lower left
```

```
# yll: y lower left
```

```
# xur: x upper right
```

```
# yur: y upper right
```

# Changing the coordinate system

```
from graphics import *                                # setCoords(xll, yll, xur, yur)

win = GraphWin("My Window", 200, 200)              # xll: x lower left
                                                    # yll: y lower left
                                                    # xur: x upper right
                                                    # yur: y upper right

# win.setCoords(0, 0 , 200, 200)

rect = Rectangle(Point(25,25), Point(75,75))
rect.draw(win)

win.getMouse()
```



**Comment line**

# Changing the coordinate system

```
from graphics import *
```

```
win = GraphWin("My Window", 200, 200)
```

```
# win.setCoords(0, 0 , 200, 200)
```

```
rect = Rectangle(Point(25,25), Point(75,75))  
rect.draw(win)
```

```
win.getMouse()
```

```
# setCoords(xll, yll, xur, yur)
```

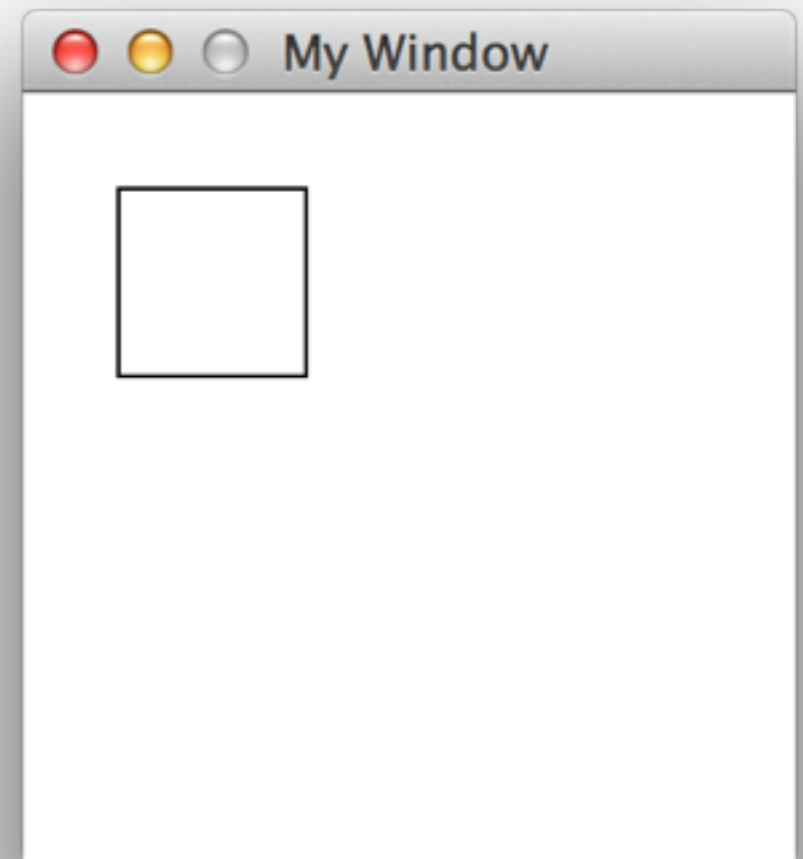
```
# xll: x lower left
```

```
# yll: y lower left
```

```
# xur: x upper right
```

```
# yur: y upper right
```

**Like we are used to**



# Changing the coordinate system

```
from graphics import *                                # setCoords(xll, yll, xur, yur)

win = GraphWin("My Window", 200, 200)              # xll: x lower left
                                                    # yll: y lower left
                                                    # xur: x upper right
                                                    # yur: y upper right

win.setCoords(0, 0 , 200, 200)

rect = Rectangle(Point(25,25), Point(75,75))
rect.draw(win)

win.getMouse()
```



# Changing the coordinate system

```
from graphics import *                                # setCoords(xll, yll, xur, yur)

win = GraphWin("My Window", 200, 200)               # xll: x lower left
                                                    # yll: y lower left
                                                    # xur: x upper right
                                                    # yur: y upper right

win.setCoords(0, 0 , 200, 200)

rect = Rectangle(Point(25,25), Point(75,75))
rect.draw(win)

win.getMouse()
```

**Comment line removed**

# Changing the coordinate system

```
from graphics import *
```

```
win = GraphWin("My Window", 200, 200)
```

```
win.setCoords(0, 0 , 200, 200)
```

```
rect = Rectangle(Point(25,25), Point(75,75))  
rect.draw(win)
```

```
win.getMouse()
```

```
# setCoords(xll, yll, xur, yur)
```

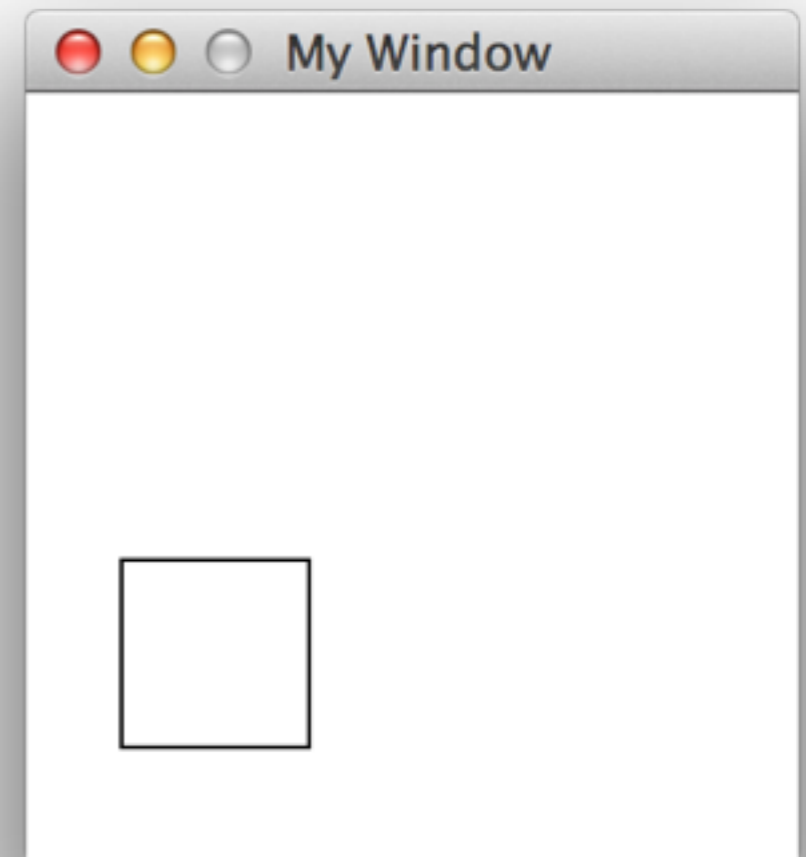
```
# xll: x lower left
```

```
# yll: y lower left
```

```
# xur: x upper right
```

```
# yur: y upper right
```

**The position of the rectangle is changed!**



# Changing the coordinate system

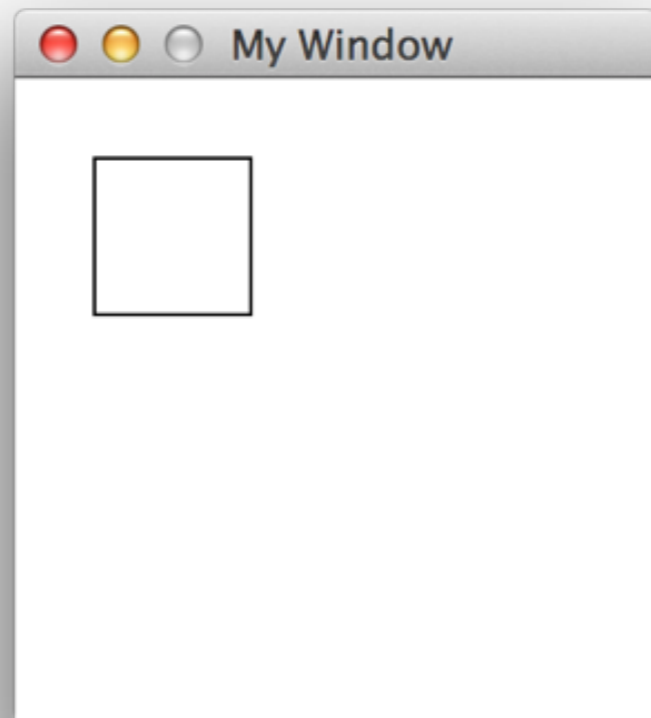
```
from graphics import *
```

```
win = GraphWin("My Window", 200, 200)
```

```
# win.setCoords(0, 0 , 200, 200)
```

```
rect = Rectangle(Point(25,25), Point(75,75))  
rect.draw(win)
```

```
win.getMouse()
```



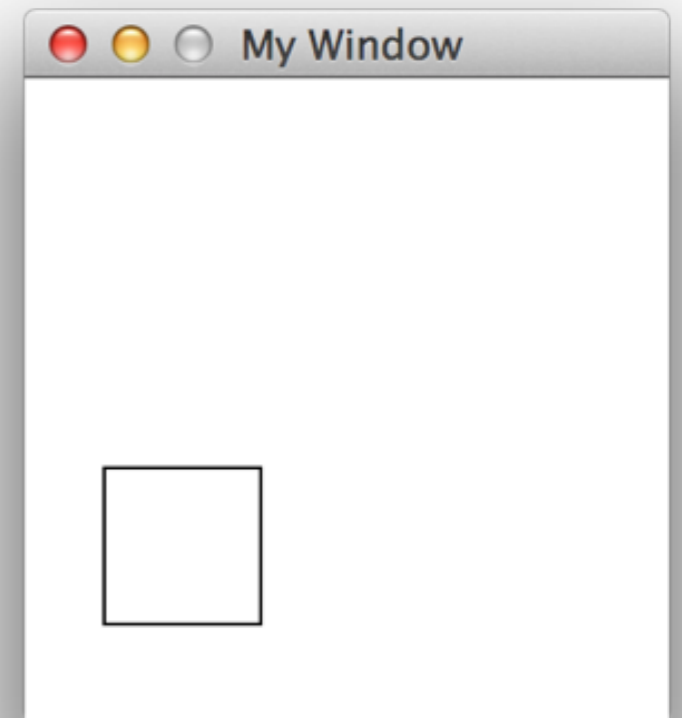
```
from graphics import *
```

```
win = GraphWin("My Window", 200, 200)
```

```
win.setCoords(0, 0 , 200, 200)
```

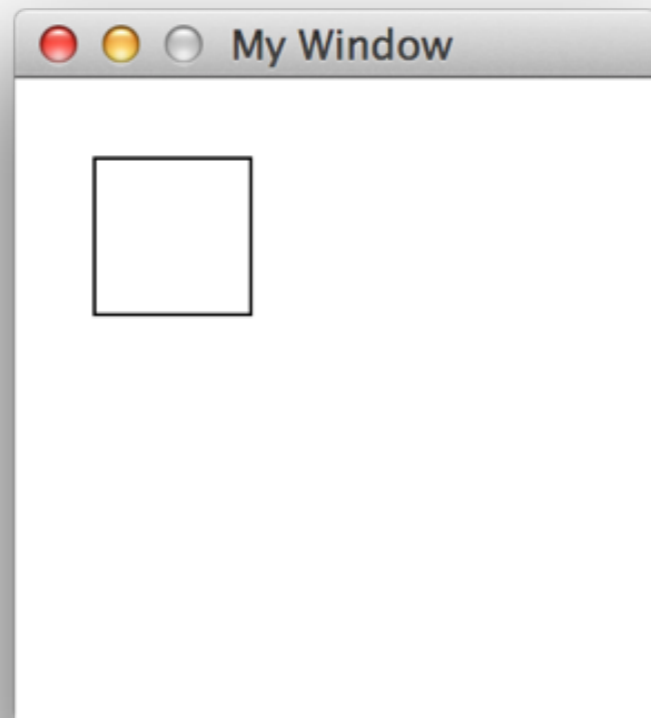
```
rect = Rectangle(Point(25,25), Point(75,75))  
rect.draw(win)
```

```
win.getMouse()
```



# Changing the coordinate system

```
from graphics import *  
  
win = GraphWin("My Window", 200, 200)  
  
# win.setCoords(0, 0 , 200, 200)  
  
rect = Rectangle(Point(25,25), Point(75,75))  
rect.draw(win)  
  
win.getMouse()
```



```
from graphics import *  
  
win = GraphWin("My Window", 200, 200)  
  
win.setCoords(200, 0, 0, 200) Change  
  
rect = Rectangle(Point(25,25), Point(75,75))  
rect.draw(win)  
  
win.getMouse()
```

Draw your expected output on a piece of paper!

# Changing the coordinate system

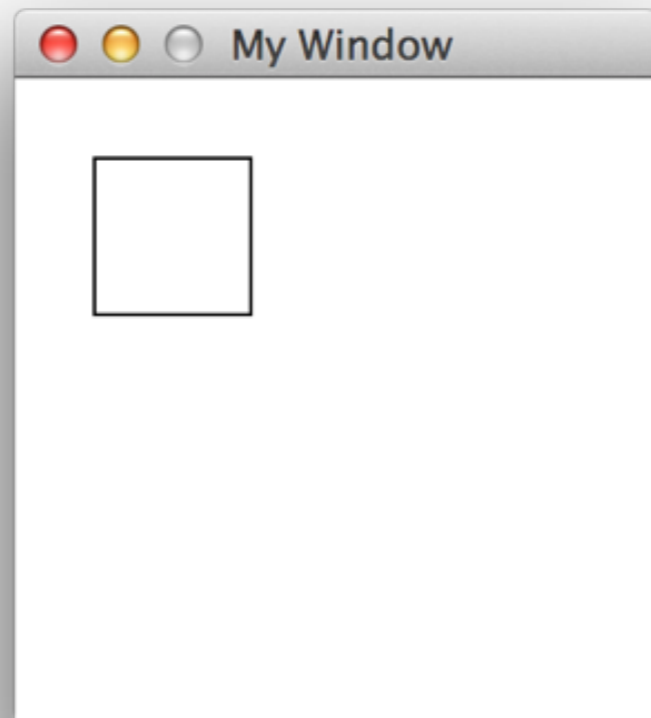
```
from graphics import *
```

```
win = GraphWin("My Window", 200, 200)
```

```
# win.setCoords(0, 0, 200, 200)
```

```
rect = Rectangle(Point(25,25), Point(75,75))  
rect.draw(win)
```

```
win.getMouse()
```



```
from graphics import *
```

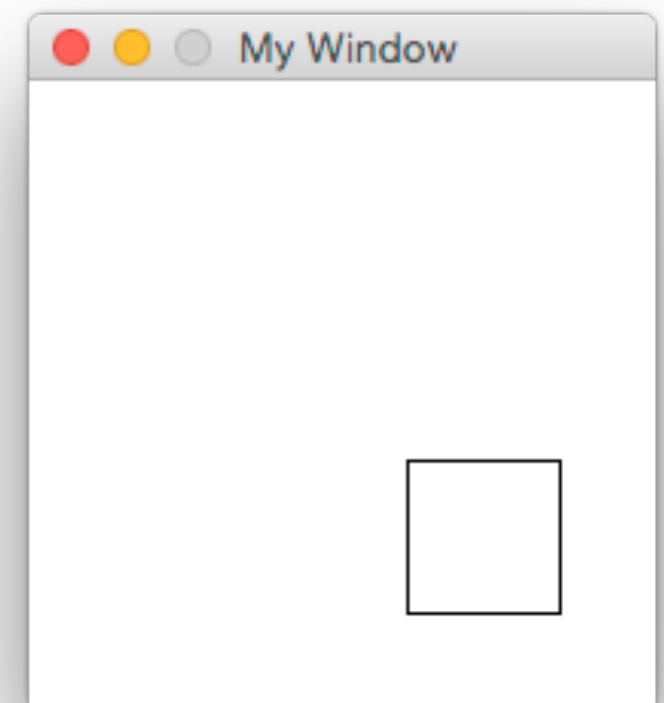
```
win = GraphWin("My Window", 200, 200)
```

```
win.setCoords(200, 0, 0, 200)
```

Change

```
rect = Rectangle(Point(25,25), Point(75,75))  
rect.draw(win)
```

```
win.getMouse()
```



# Changing the coordinate system

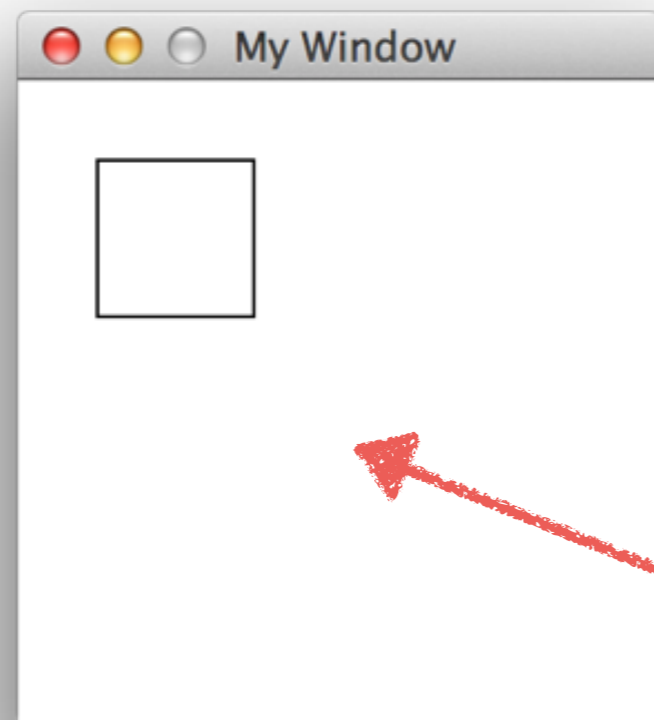
```
from graphics import *
```

```
win = GraphWin("My Window", 200, 200)
```

```
# win.setCoords(0, 0 , 200, 200)
```

```
rect = Rectangle(Point(25,25), Point(75,75))  
rect.draw(win)
```

```
win.getMouse()
```



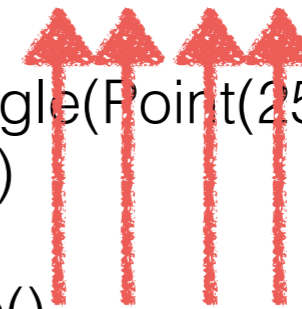
```
from graphics import *
```

```
win = GraphWin("My Window", 200, 200)
```

```
win.setCoords(a, b, c, d)
```

```
rect = Rectangle(Point(25,25), Point(75,75))  
rect.draw(win)
```

```
win.getMouse()
```



???

What are the values of a, b, c and d to get the same output?

Character

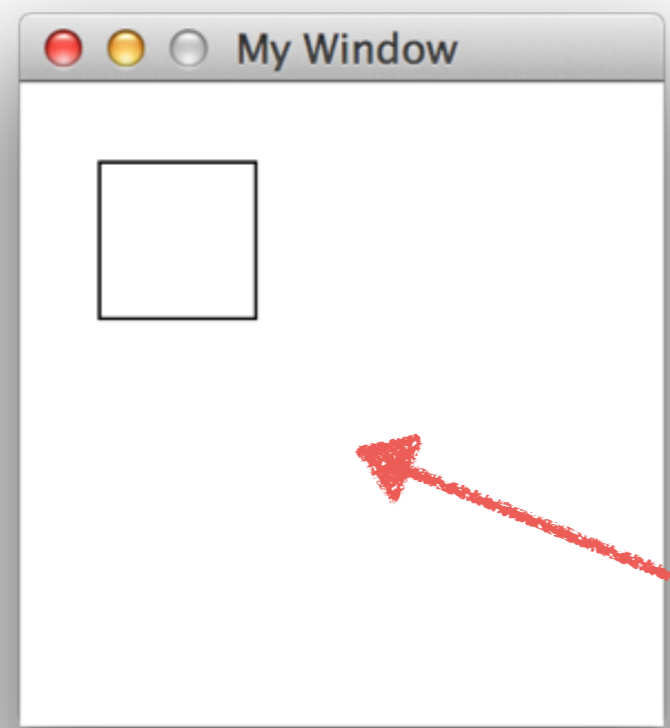
Write your expected  
a,b,c and d  
to a piece of paper.

nate

```

from graphics import *
win = GraphWin("My Window", 200, 200)
# win.setCoords(0, 0 , 200, 200)
rect = Rectangle(Point(25,25), Point(75,75))
rect.draw(win)
win.getMouse()

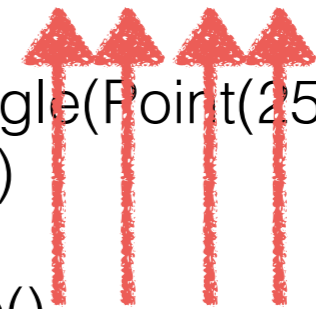
```



```

from graphics import *
win = GraphWin("My Window", 200, 200)
win.setCoords(a, b, c, d)
rect = Rectangle(Point(25,25), Point(75,75))
rect.draw(win)
win.getMouse()

```



???

What are the values of  
a,b,c and d to get the  
same output?

# Changing the coordinate system

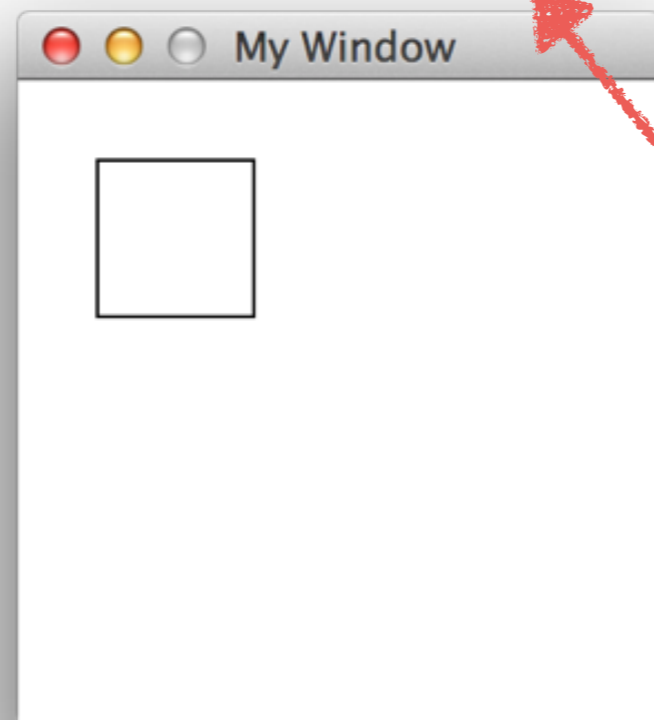
```
from graphics import *
```

```
win = GraphWin("My Window", 200, 200)
```

```
# win.setCoords(0, 0, 200, 200)
```

```
rect = Rectangle(Point(25,25), Point(75,75))  
rect.draw(win)
```

```
win.getMouse()
```



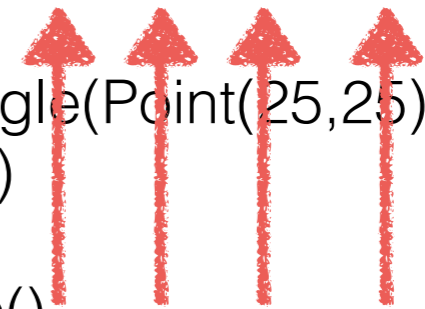
```
from graphics import *
```

```
win = GraphWin("My Window", 200, 200)
```

```
win.setCoords(0, 200, 200, 0)
```

```
rect = Rectangle(Point(25,25), Point(75,75))  
rect.draw(win)
```

```
win.getMouse()
```



Both programs  
produce the same  
output.



# Common mistakes

```
from graphics import *
```

```
win = GraphWin("My Window", 200, 200)  
rect = Rectangle(Point(50,50), Point(150,150))
```

```
Rectangle.draw(win)
```

```
win.getMouse()
```

# Common mistakes

```
from graphics import *
```

```
win = GraphWin("My Window", 200, 200)  
rect = Rectangle(Point(50,50), Point(150,150))
```

~~Rectangle.draw(win)~~

**rect.draw(win)**

```
win.getMouse()
```

# Common mistakes

```
from graphics import *
```

```
win = GraphWin("My Window", 200, 200)
```

```
rect = Rectangle(50,50,150,150)
```

```
rect.draw(win)
```

```
win.getMouse()
```

# Common mistakes

```
from graphics import *
```

```
win = GraphWin("My Window", 200, 200)
```

```
rect = Rectangle(50, 50, 150, 150)
```

```
rect.draw(win)
```

```
Rectangle(Point(50,50), Point(150,150))
```

```
win.getMouse()
```

# More exercises

- Draw a **Rectangle** with only using **Line**'s for given point1 and point2.
- Draw a **line** with only using **plot(x, y, color)** for given point1 and point2.
- Draw a circle with only using **plot(x, y, color)**. **Hint:** You may need to use **math** library.

# A good summary:

by the people who wrote the library

<http://mcsp.wartburg.edu/zelle/python/graphics/graphics.pdf>

# Questions?

Thanks