CS21: Using the Zelle Graphics Library

To use the graphics library, first import it at the top of your program:

```
from graphics import *
```

Here is a short example showing how to create a new graphics window object and then create gui objects to draw into this window:

```
win = GraphWin("Graphics!!!!!!", 500, 500)   # creates new GraphWin object, 500x500 pixels in size
win.setBackground("blue")                    # set the background color to blue

cp = Point(50,50)           # creates a new Point object at 50,50
circ = Circle(cp, 20)       # creates new Circle object centered at point cp with a radius of 20 pixels
circ.setFill("red")         # invoke the setFill method of the Circle object referred to by circ
circ.draw(win)              # draw the circ object to the GraphWin win
```

REFERENCE INFO BELOW

There is a lot to sort through in the graphics library help documentation. To simplify things a bit, below is some information about the GraphWin object and common Graphics objects you may want to use. Section 5.8 of the Zelle text also contains a more complete reference for the classes in the graphics library.

```
class GraphWin
--------------

        GraphWin(title, width, height)

        close()
        flush()  # update drawing to graphics window

        getHeight()
        getWidth()

        getMouse() # wait for mouse click and return Point obj representing click location
        getKey()   # wait for key press and return string representing key pressed (e.g., 'q')
        checkMouse() # check if mouse was clicked, return None if it was not clicked
        checkKey()   # check if key was pressed, return None if no keys were pressed

        setBackground(color)   # color could be something like "red"

        # Sets the coordinate system of the window so that the lower
        # left corner is at (xll, yll) and the upper right corner is
        # at (xur, yur)
        setCoords(xll, yll, xur, yur)
```

Example:

```
mywin = GraphWin("ponies!!", 600, 500)
mywin.setBackground("lightblue")
```

```
class Point
------------

     Point(x, y)

     clone()    # create a new Point object that is an exact copy of this one
     getX()     # the int value of the Point's x-coordinate
     getY()     # the int value of the Point's y-coordinate

     ----------------------- Methods common to all Graphics Object classes:

     draw(graphwin):    # Draw the object in graphwin, which should be a
                        # GraphWin object.  A GraphicsObject may only be drawn
                        # into one window.
     move(dx, dy):      # move object dx units in x and dy units in y direction
     setFill(color):    # Set interior color to color
     setOutline(color): # Set outline color to color
     setWidth(width):   # Set line weight to width
     undraw():          # Undraw the object (i.e. hide it).
```

Example:

```
p1 = Point(300, 450)
p1.draw(mywin)
x1 = p1.getX()
x2 = p1.getY()
p2 = p1.clone()
p2.move(100,20)
p2.draw(mywin)
```

class Line

```
Line(p1, p2)   # p1 and p2 are the end Points of the line

clone()
setArrow(option)
getCenter()    # returns a Point object corresponding to the Line's center
getP1()        # get one end-point Point object
getP2()        # get the other Point object

draw(graphwin)
move(dx, dy)   # move the Line dx pixels on the x-axis and dy on the y-axis
setFill(color)
setOutline(color)
setWidth(width)
```

Example:

```
p1 = Point(0, 250)
p2 = Point(600, 250)

longline = Line(p1, p2)
longline.setWidth(5)
longline.draw(mywin)
```

class Rectangle

```
Rectangle( p1, p2)  # p1 and p2 are points for upper left and lower right

clone()
getCenter()  # returns a Point object corresponding to the center
getP1()      # returns the upper left corner Point
getP2()      # returns the lower right corner Point

draw(graphwin)
move(dx, dy)          # move the Rectangle dx pixels on x-axis, dy on y-axis
setFill(color)
setOutline(color)
setWidth(width)   # set the width, in pixels of the outline
undraw()
```

Example:

```
p1 = Point(100, 100)
p2 = Point(200, 200)

square = Rectangle(p1, p2)
square.draw(mywin)
```

class Circle

```
Circle(p1, radius)       # p1 is a Point at the center of the circle, radius is an int

clone()
getCenter()    # returns the Point object describing the Circle's center
getRadius()    # returns the int value of the Circle's radius
getP1()    # returns a clone of the corresponding corner of the
getP2()      # circle's bounding box (opposite corners of bounding square)
```

```
     draw(graphwin)
     move(dx, dy)   # distance in x and y axis to move the circle
     setFill(color)
     setOutline(color)
     setWidth(width)  # the width of the circle's outline
     undraw()
```

Example:

```
center = Point(100, 100)
radius = 35
sun = Circle(center, radius)
sun.setFill("yellow")
sun.setOutline("yellow")
sun.draw(mywin)
```

```
class Oval
----------
     Oval(p1, p2)    # p1 and p2 are Points of opposite corners of bounding rectangle

     clone()
     getCenter()
     getP1()
     getP2()

     draw(graphwin)
     move(dx, dy)
     setFill(color)
     setOutline(color)
     setWidth(width)
```

```
class Polygon
-------------

     Polygon()

     getPoints()  # return a list of Points in the polygon
     clone()

     draw(graphwin)
     move(dx, dy)
     setFill(color)
     setOutline(color)
     setWidth(width)
     undraw()
```

Example (a triangle):

```
p1 = Point(10,20)
p2 = Point(10,60)
p3 = Point(30,40)
trilist = [p1,p2,p3]
tri = Polygon(trilist)
tri.setOutline("pink")
tri.setFill("blue")
tri.draw(mywin)
```

```
class Text
----------
     Text(p, text)  # p is center point and text is string

     clone()
     getAnchor()         # returns clone of anchor point
     getText()           # get the text of this Text Object
     setText(text)       # change text of given object
     setTextColor(color)
     setFace(family)     # set font face, ex. "arial" "courier"
     setSize(size)       # set font size (5-36 are legal)
     setStyle(style)     # set font style  ex.  "bold" "italic"

     draw(graphwin)
```

```
    move(dx, dy)
    setFill(color)
    setOutline(color)
    setWidth(width)
    undraw()
```

Example:

```
message = Text(Point(300, 100), "please click anywhere to close window")
message.setSize(24)
message.setTextColor("red")
message.draw(mywin)
```

```
class Entry: GUI object into which user can type text
------------

    Entry(pt, width)     # pt is anchor Point (center) width is an int

    getAnchor()          # returns the center Point
    getText()            # returns the current text
    setText(string)      # sets the text to string
    setSize(point)       # sets the found size (5-36 are legal)
    setStyle(style)      # sets the font style
    setTextColor(color)  # sets the text color

    draw(graphwin)
    move(dx, dy)
    setFill(color)
    setOutline(color)
    setWidth(width)
    undraw()
```

You can see all of the classes in the graphics library and each class' set of methods by running **help(graphics)** in interactive mode:

```
$ python
>>> import graphics
>>> help(graphics)
```

To see the full set of colors available to you:

```
$ python
>>> from colorPicker import *
>>> colorPicker()
# then click on a color and its name will show up in the python interpreter
```