

**BIS 420 PROGRAMMING FOR DATA SCIENCE**  
**PRAJAKTA POHARE**  
**CHAPTER 15 EXERCISE 15.4**  
**ILLINOIS STATE UNIVERSITY**

Swampy (see Chapter 4) provides a module named World, which defines a user-defined type also called World. You can import it like this:

```
from swampy.World import World
```

Or, depending on how you installed Swampy, like this:

```
from World import World
```

The following code creates a World object and calls the mainloop method, which waits for the user.

```
world = World()
```

```
world.mainloop()
```

A window should appear with a title bar and an empty square. We will use this window to draw Points, Rectangles and other shapes. Add the following lines before calling mainloop and run the program again.

```
canvas = world.ca(width=500, height=500, background='white')
```

```
bbox = [[-150,-100], [150, 100]]
```

```
canvas.rectangle(bbox, outline='black', width=2, fill='green4')
```

You should see a green rectangle with a black outline. The first line creates a Canvas, which appears in the window as a white square. The Canvas object provides methods like rectangle for drawing various shapes.

bbox is a list of lists that represents the “bounding box” of the rectangle. The first pair of coordinates is the lower-left corner of the rectangle; the second pair is the upper-right corner.

You can draw a circle like this: `canvas.circle([-25,0], 70, outline=None, fill='red')`

The first parameter is the coordinate pair for the center of the circle; the second parameter is the radius.

If you add this line to the program, the result should resemble the national flag of Bangladesh (see [http://en.wikipedia.org/wiki/Gallery\\_of\\_sovereign-state\\_flags](http://en.wikipedia.org/wiki/Gallery_of_sovereign-state_flags)).

1. Write a function called `draw_rectangle` that takes a `Canvas` and a `Rectangle` as arguments and draws a representation of the `Rectangle` on the `Canvas`.
2. Add an attribute named `color` to your `Rectangle` objects and modify `draw_rectangle` so that it uses the `color` attribute as the fill color.
3. Write a function called `draw_point` that takes a `Canvas` and a `Point` as arguments and draws a representation of the `Point` on the `Canvas`.
4. Define a new class called `Circle` with appropriate attributes and instantiate a few `Circle` objects. Write a function called `draw_circle` that draws circles on the canvas.
5. Write a program that draws the national flag of the Czech Republic. Hint: you can draw a polygon like this:

```
points = [[-150,-100], [150, 100], [150, -100]]  
canvas.polygon(points, fill='blue')
```

I have written a small program that lists the available colors; you can download it from [http://thinkpython.com/code/color\\_list.py](http://thinkpython.com/code/color_list.py).

