Laboratory 2

COMSC-122

Fall 2017

Turtle Graphics

- We can import an entire graphics package which gives us the ability to draw lines in any direction, and change direction at will.
- This gives us the ability to draw the outline of any object.
- We can fill the object with any color we choose.
- We can draw circles
- We can print text among the graphics
- We can specify line thickness and color
- We can control the background color.
- This is all contained in section 2.10 of the text.

A Few Turtle Commands

- import turtle
- turtle.forward(#pixels)
- turtle.right(#degrees)
- turtle.left(#degrees)
- turtle.setheading(#degrees)
- turtle.heading()
- turtle.penup()
- turtle.pendown()
- turtle.circle(#radius)
- turtle.begin_fill()
- turtle.end_fill()
- turtle.pencolor(color)
- turtle.bgcolor(color)
- turtle.reset()
- turtle.clear()
- turtle.clearscreen()
- turtle.setup(X, Y)
- turtle.goto(X,Y)
- turtle.pos()
- turtle.hideturtle()
- turtle.write('####')
- turtle.end()

Graphing the Constellation Orion

- Program2-23 is a good example of using a simple sequence of instructions to draw a complex diagram on the screen.
- In this case we're going to be plotting all the stars that make up the Constellation of Orion, and we will be identifying each of them by name.
- Enter program 2-23, shown in the following pages, taking extreme care to get your capitalization correct. One error and it won't work.
- It is not necessary to enter in all the comments for the program to work, only the code is necessary for this lab.
- When you have your program successfully generating the Constellation Orion, call the instructor over so that you might be given proper credit for your work.
  - There is no need to submit your program to Canvas, but the Instructor must see your work demonstrated.
  - Execute the program both from within IDLE as well as from Windows Explorer.

Program 2-23 (orion.py)

```
1  # This program draws the stars of the Orion constellation,
2  # the names of the stars, and the constellation lines.
3  import turtle
4
5  # Set the window size.
6  turtle.setup(500, 600)
7
8  # Setup the turtle.
9  turtle.penup()
10 turtle.hideturtle()
11
12 # Create named constants for the star coordinates.
13 LEFT_SHOULDER_X = -70
14 LEFT_SHOULDER_Y = 200
15
16 RIGHT_SHOULDER_X = 80
17 RIGHT_SHOULDER_Y = 180
18
19 LEFT_BELTSTAR_X = -40
```

Using turtle graphics to display the Orion Constellation Part 1 of 5

```
20  LEFT_BELTSTAR_Y = -20
21
22  MIDDLE_BELTSTAR_X = 0
23  MIDDLE_BELTSTAR_Y = 0
24
25  RIGHT_BELTSTAR_X = 40
26  RIGHT_BELTSTAR_Y = 20
27
28  LEFT_KNEE_X = -90
29  LEFT_KNEE_Y = -180
30
31  RIGHT_KNEE_X = 120
32  RIGHT_KNEE_Y = -140
33
34  # Draw the stars.
35  turtle.goto(LEFT_SHOULDER_X, LEFT_SHOULDER_Y)          # Left shoulder
36  turtle.dot()
37  turtle.goto(RIGHT_SHOULDER_X, RIGHT_SHOULDER_Y)        # Right shoulder
38  turtle.dot()
39  turtle.goto(LEFT_BELTSTAR_X, LEFT_BELTSTAR_Y)          # Left belt star
40  turtle.dot()
41  turtle.goto(MIDDLE_BELTSTAR_X, MIDDLE_BELTSTAR_Y)      # Middle belt star
42  turtle.dot()
43  turtle.goto(RIGHT_BELTSTAR_X, RIGHT_BELTSTAR_Y)        # Right belt star
44  turtle.dot()
```

Using turtle graphics to display the Orion Constellation Part 2 of 5

```
45  turtle.goto(LEFT_KNEE_X, LEFT_KNEE_Y)                    # Left knee
46  turtle.dot()
47  turtle.goto(RIGHT_KNEE_X, RIGHT_KNEE_Y)                  # Right knee
48  turtle.dot()
49
50  # Display the star names
51  turtle.goto(LEFT_SHOULDER_X, LEFT_SHOULDER_Y)            # Left shoulder
52  turtle.write('Betegeuse')
53  turtle.goto(RIGHT_SHOULDER_X, RIGHT_SHOULDER_Y)          # Right shoulder
54  turtle.write('Meissa')
55  turtle.goto(LEFT_BELTSTAR_X, LEFT_BELTSTAR_Y)            # Left belt star
56  turtle.write('Alnitak')
57  turtle.goto(MIDDLE_BELTSTAR_X, MIDDLE_BELTSTAR_Y)        # Middle belt star
58  turtle.write('Alnilam')
59  turtle.goto(RIGHT_BELTSTAR_X, RIGHT_BELTSTAR_Y)          # Right belt star
60  turtle.write('Mintaka')
61  turtle.goto(LEFT_KNEE_X, LEFT_KNEE_Y)                    # Left knee
62  turtle.write('Saiph')
63  turtle.goto(RIGHT_KNEE_X, RIGHT_KNEE_Y)                  # Right knee
64  turtle.write('Rigel')
65
66  # Draw a line from the left shoulder to left belt star
67  turtle.goto(LEFT_SHOULDER_X, LEFT_SHOULDER_Y)
68  turtle.pendown()
```

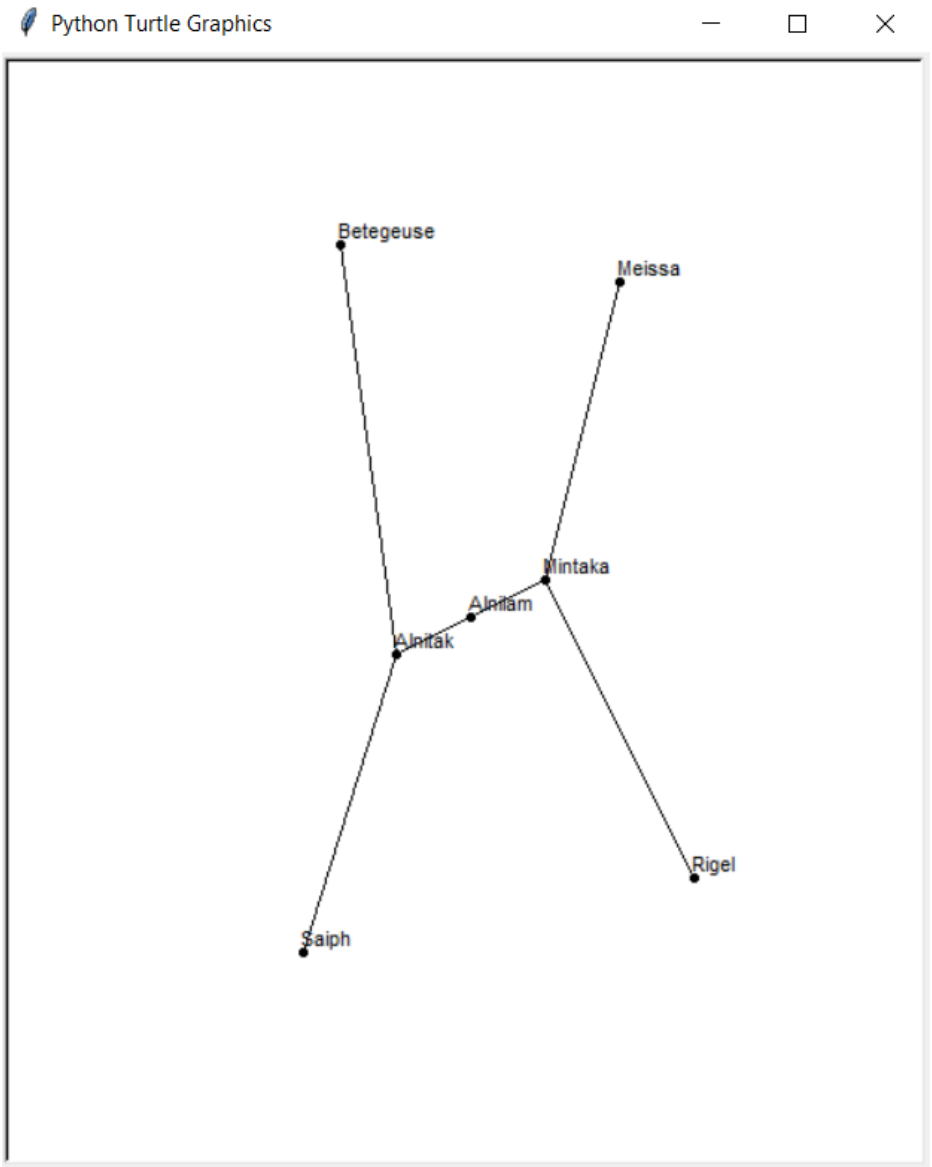
Using turtle graphics to display the Orion Constellation Part 3 of 5

```
69  turtle.goto(LEFT_BELTSTAR_X, LEFT_BELTSTAR_Y)
70  turtle.penup()
71
72  # Draw a line from the right shoulder to right belt star
73  turtle.goto(RIGHT_SHOULDER_X, RIGHT_SHOULDER_Y)
74  turtle.pendown()
75  turtle.goto(RIGHT_BELTSTAR_X, RIGHT_BELTSTAR_Y)
76  turtle.penup()
77
78  # Draw a line from the left belt star to middle belt star
79  turtle.goto(LEFT_BELTSTAR_X, LEFT_BELTSTAR_Y)
80  turtle.pendown()
81  turtle.goto(MIDDLE_BELTSTAR_X, MIDDLE_BELTSTAR_Y)
82  turtle.penup()
83
84  # Draw a line from the middle belt star to right belt star
85  turtle.goto(MIDDLE_BELTSTAR_X, MIDDLE_BELTSTAR_Y)
86  turtle.pendown()
87  turtle.goto(RIGHT_BELTSTAR_X, RIGHT_BELTSTAR_Y)
88  turtle.penup()
```

Using turtle graphics to display the Orion Constellation Part 4 of 5

Using turtle graphics to display the Orion Constellation Part 5 of 5

```
89
90  # Draw a line from the left belt star to left knee
91  turtle.goto(LEFT_BELTSTAR_X, LEFT_BELTSTAR_Y)
92  turtle.pendown()
93  turtle.goto(LEFT_KNEE_X, LEFT_KNEE_Y)
94  turtle.penup()
95
96  # Draw a line from the right belt star to right knee
97  turtle.goto(RIGHT_BELTSTAR_X, RIGHT_BELTSTAR_Y)
98  turtle.pendown()
99  turtle.goto(RIGHT_KNEE_X, RIGHT_KNEE_Y)
100
101 # Keep the window open. (Not necessary with IDLE.)
102 turtle.done()
```



Program2-23 Result

The Constellation Orion