

## Week 12: Exercise Solutions

### Exercise 12.1.

1.

```
import numpy as np
import matplotlib.pyplot as plt

theta = np.linspace(0, 2*np.pi, 100)

plt.plot(0.9*np.cos(theta), 0.4*np.sin(theta))
plt.axes().set_aspect("equal")
plt.axis([-1.1, 1.1, -1.1, 1.1])
plt.show()
```

2.

```
import numpy as np
import matplotlib.pyplot as plt

theta = np.linspace(0, 12, 100)

plt.plot(theta*np.cos(theta), theta*np.sin(theta))
plt.gca().set_aspect("equal")
plt.axis([-11, 11, -11, 11])
plt.show()
```

### Exercise 12.2.

```
import matplotlib.pyplot as plt

# Plot the vertical lines
for i in range(9):
    plt.plot([i, i], [0, 8], color="blue")

# Plot the horizontal lines
for i in range(9):
    plt.plot([0, 8], [i, i], color="blue")

plt.gca().set_aspect("equal")
plt.axis([-1, 9, -1, 9])
plt.show()
```

**Exercise 12.3.** Add the `draw_circle()` function to the beginning of the program and add the following after the drawing of the spokes.

```
for radius in range(1, 10):
    draw_circle([0, 0], radius/10)
```

**Exercise 12.5.** Change the 5 in Line 7 to a 10, and add the following at Line 12, indented eight spaces.

```
size[i] = 1
```