AA 274A: Principles of Robot Autonomy I
Section 1

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Problem 1

Define a sin function using NumPy

```
sine = lambda x: np.sin(x)
```

Problem 2

Find the minimum of the function using SciPy

```
res = scipy.optimize.minimize(sine, x0=[0])

print("X Location of minimum: {}".format(res.x[0]))
print("Value of sin(x): {}".format(sine(res.x[0])))

# X Location of minimum: -1.5707963335877664
# Value of sin(x): -1.0
```

Problem 3

Integrate the function from [0, 1] using SciPy

```
res = scipy.integrate.quad(sine, 0.0, 1.0)

print("Integral of sin(x) from x=0...1: {}".format(res[0]))

# Integral of sin(x) from x=0...1: 0.45969769413186023
```

Problem 4

Plot the function using Matplotlib from $[0, 2\pi]$

```
x = np.linspace(0, 2*np.pi, 500)
y = sine(x)

plt.plot(x,y)
plt.title(r'Sine Wave [0, 2$\pi$]')
plt.xlabel("x")
plt.ylabel("sin(x)")
plt.grid()
plt.savefig("sine_wave.png")
```