Exercise 1

```
X = np.matrix([
    [1, 4],
    [1, 1],
    [1, 6],
    [1, 18],
    [1, 8]
])

z = np.array([3.5, 1, 3.8, 10.1, 8.5])

# Calculate weights vector
beta_ols = np.linalg.inv(X.T @ X) @ X.T @ z
beta_ols = np.array(beta_ols).flatten()

# Extract intercept and slope
w0, w1 = beta_ols

print(f"Intercept (w0): {w0:.5f}")
print(f"Slope (w1): {w1:.5f}")
```

✓ 0.0s

```
Intercept (w0): 1.46136
Slope (w1): 0.52955
```

Exercise 2

```
# Calculate Ridge weights vector
penalty = 1

I = np.eye(X.shape[1])
# I[0, 0] = 0  # don't regularize intercept

beta_ridge = np.linalg.inv(X.T @ X + I*penalty) @ X.T @ z
beta_ridge = np.array(beta_ridge).flatten()

# Extract intercept and slope
w0, w1 = beta_ridge

print(f"Intercept (w0): {w0:.5f}")
print(f"Slope (w1): {w1:.5f}")
```

✓ 0.0s

```
Intercept (w0): 0.97319
Slope (w1): 0.56921
```