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import matplotlib.pyplot as plt

import numpy as np

# Simulate path
path_x = np.linspace(0, 10, 100)
path_y = np.sin(path_x)

# Simulate robot following the path
robot_x = []
robot_y = []

# Initial robot position
x, y = 0, 0
learning_rate = 0.1

# Follow the path
for target_x, target_y in zip(path_x, path_y):
    error_x = target_x - x
    error_y = target_y - y

    # Move a small step toward the path point
    x += learning_rate * error_x
    y += learning_rate * error_y

    robot_x.append(x)
    robot_y.append(y)
```

```
# Plotting

plt.figure(figsize=(10, 5))

plt.plot(path_x, path_y, 'g--', label='Target Path (Sine Wave)')

plt.plot(robot_x, robot_y, 'b-', label='Robot Path (Following)')

plt.title('Autonomous Robot Path Following Simulation')

plt.xlabel('X')

plt.ylabel('Y')

plt.legend()

plt.grid(True)

plt.show()
```

Autonomous Robot Path Following Simulation

