import numpy as np

def objective\_function(x):

return x\*\*2 + 4\*x + 4

def gradient(x):

return 2\*x + 4

def line\_search(initial\_x, learning\_rate, epsilon):

x = initial\_x

iteration = 0

while True:

gradient\_x = gradient(x)

new\_x = x - learning\_rate \* gradient\_x

# Check for convergence

if abs(new\_x - x) < epsilon:

break

x = new\_x

iteration += 1

return x, objective\_function(x), iteration

# Initial parameters

initial\_x = 0.0

learning\_rate = 0.1

epsilon = 1e-6

result\_x, result\_min, iterations = line\_search(initial\_x, learning\_rate, epsilon)

print(f"Minimum value found at x = {result\_x}")

print(f"Minimum objective function value = {result\_min}")

print(f"Iterations: {iterations}")