ASSIGNMENT 1

Name: Sneha Upadhyay

Subject: Introduction to python

QUESTION:

Minimizing a multivariable function:

Problem statement-

f (x, y) = x² + y² 2 + 3x + + 4y +5

SOURCE CODE:

from SciPy. Optimize import minimize

```python
# Define the multivariable function
def objective(vars):
    x, y = vars
    return x**2 + y**2 + 3*x + 4*y + 5

# Initial guess
initial_guess = [0, 0]

# Minimize the function
result = minimize(objective, initial_guess)
print("Minimum found at (x, y):", result.x)
print("Minimum value of the function:", result.fun)
```

OUTPUT:

Minimum found at (x, y): [-1.49999997 -2.00000001]

Minimum value of the function: -1.2499999999999991

SOURCE CODE:

import numpy as np

```python
import matplotlib.pyplot as plt
from mpl_toolkits.mplot3d import Axes3D


# Define the function f(x, y)
def f(x, y):
    return x**2 + y**2 + 3*x + 4*y + 5


# Generate x and y values
x = np.linspace(-3, 1, 400)
y = np.linspace(-3, 1, 400)
x, y = np.meshgrid(x, y)
z = f(x, y)


# Minimum point coordinates
min_x = -1.5
min_y = -2.0
min_z = f(min_x, min_y)


# Create a 3D plot
fig = plt.figure(figsize=(10, 7))
ax = fig.add_subplot(111, projection='3d')


# Plot the surface
ax.plot_surface(x, y, z, cmap='viridis', alpha=0.8)


# Highlight the minimum point
ax.scatter(min_x, min_y, min_z, color='red', s=100, label=f"Min at ({min_x}, {min_y}, {min_z})")


# Set labels
ax.set_xlabel('X axis')
ax.set_ylabel('Y axis')
```

ax.set_zlabel('f(x, y)')

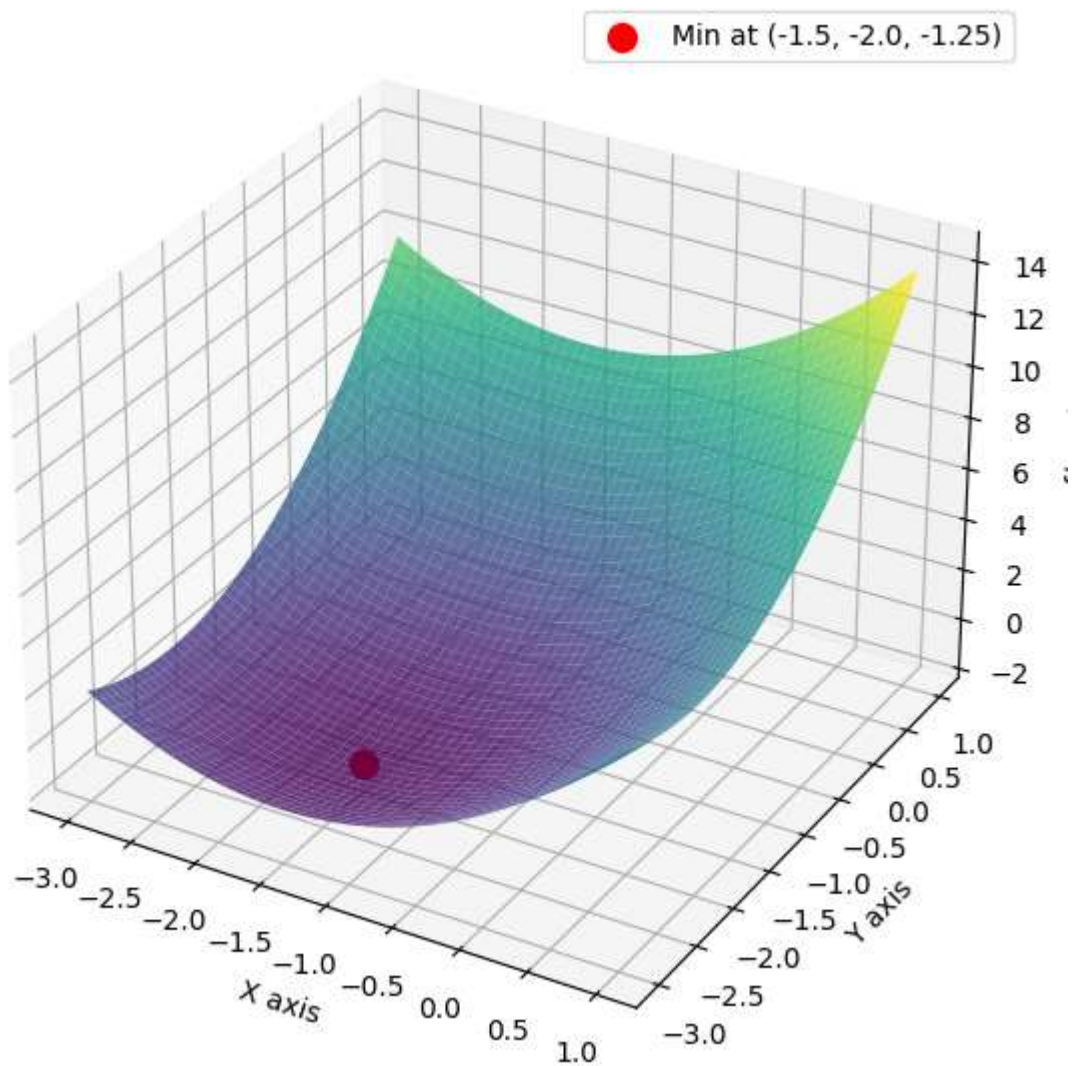# Add a legend

ax.legend()

Show the plot

plt.show()

OUTPUT:

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