

MDSC 103-Lab Test-Roll number 23902

2. Consider the following problem:

$$f(x_1, x_2) = 4x_1 + 6x_2 - 2x_1^2 - 2x_1x_2 - 2x_2^2$$

- Write a program to visualize the above function.
- Write an iterative program to maximize the function.



23902_MDSC-102-ESE Last Checkpoint: 2 hours ago (unsaved changes)



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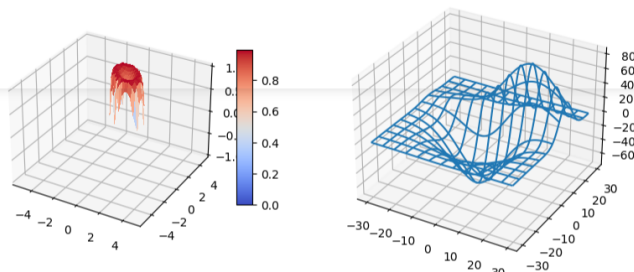
File Edit View Insert Cell Kernel Widgets Help Trusted Python 3 (ipykernel) O

```
In [ ]: from scipy.optimize import minimize
from scipy import optimize
from scipy.optimize import minimize
import numpy as np
import matplotlib.pyplot as plt
```

3d Subplot

```
In [25]: import matplotlib.pyplot as plt
from mpl_toolkits.mplot3d import Axes3D, get_test_data
from matplotlib import cm
import numpy as np
# set up a figure twice as wide as it is tall
fig = plt.figure(figsize=plt.figaspect(0.5))
# =====
# First subplot
# =====
# set up the axes for the first plot
ax = fig.add_subplot(1, 2, 1, projection='3d')
# plot a 3D surface like in the example mplot3d/surface3d_demo
X = np.arange(-5, 5, 0.25)
Y = np.arange(-5, 5, 0.25)
X, Y = np.meshgrid(X, Y)
R = np.sqrt(4*X + 6*Y - 2*X**2 - 2*X*Y - 2*Y**2)
Z = np.sin(R)
surf = ax.plot_surface(X, Y, Z, rstride=1, cstride=1, cmap=cm.coolwarm, linewidth=0, antialiased=False)
ax.set_zlim(-1.01, 1.01)
fig.colorbar(surf, shrink=0.5, aspect=10)
# =====
# Second subplot
# =====
# set up the axes for the second plot
ax = fig.add_subplot(1, 2, 2, projection='3d')
# plot a 3D wireframe like in the example mplot3d/wire3d_demo
X, Y, Z = get_test_data(0.05)
ax.plot_wireframe(X, Y, Z, rstride=10, cstride=10)
plt.show()

C:\Users\Msc 1\AppData\Local\Temp\ipykernel_5188\483067341.py:16: RuntimeWarning: invalid value encountered in sqrt
R = np.sqrt(4*X + 6*Y - 2*X**2 - 2*X*Y - 2*Y**2)
```



```
In [21]: import random
import numpy as np
import matplotlib.pyplot as plt
from matplotlib import cm
from mpl_toolkits.mplot3d import Axes3D
X = np.arange(-5, 5, 0.25)
Y = np.arange(-5, 5, 0.25)
X, Y = np.meshgrid(X, Y)
R = np.sqrt(4*X + 6*Y - 2*X**2 - 2*X*Y - 2*Y**2)
Z = np.sin(R)
fig = plt.figure()
ax = Axes3D(fig)
ax.plot_surface(X, Y, Z, rstride=1, cstride=1, cmap=cm.viridis)
plt.show()

C:\Users\Msc 1\AppData\Local\Temp\ipykernel_5188\1785549611.py:9: RuntimeWarning: invalid value encountered in sqrt
R = np.sqrt(4*X + 6*Y - 2*X**2 - 2*X*Y - 2*Y**2)

<Figure size 640x480 with 0 Axes>
```

```
In [8]: f(x1, x2) = 4x1 + 6x2 - 2x1
2 - 2x1x2 - 2x2

Cell In[8], line 1
f(x1, x2) = 4x1 + 6x2 - 2x1
^
SyntaxError: invalid decimal literal
```

```
In [31]: f = lambda x1,x2 : (-4*x[0] - 6*x[1] + 2*x[1]**2 + 2*x[0]*x[1] + 2*x[0]**2)

Cell In[31], line 1
f = lambda x1,x2 : (-4*x[0] - 6*x[1] + 2*x[1]**2 + 2*x[0]*x[1] + 2*x[0]**2)
^
SyntaxError: invalid syntax. Perhaps you forgot a comma?
```