CO544 - Lab 4

<u>TODO 1:</u>
Explain the reason to set,
fig.subplots_adjust(hspace =1.0)
in part (c).

matplotlib.pyplot.subplots_adjust(*left=None*, *bottom=None*, *right=None*, *top=None*, *wspace=None*, *hspace=None*)

The above function defines the space between subplots. In this case, the hspace=1.0 means the horizontal separation between each subplot should be the same as the height of a plot.

Without proper spacing between each subplot, data visualization can be messy. So it is recommended to keep significant space between each subplot.

fig.subplots_adjust(hspace=0)

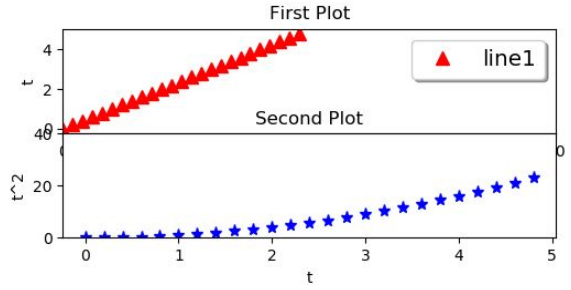
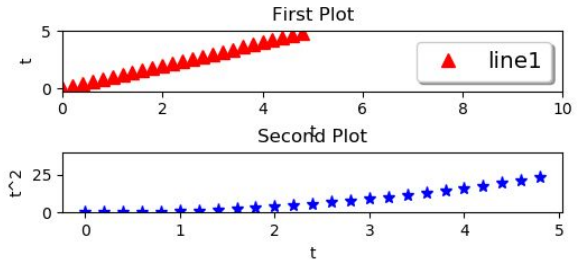
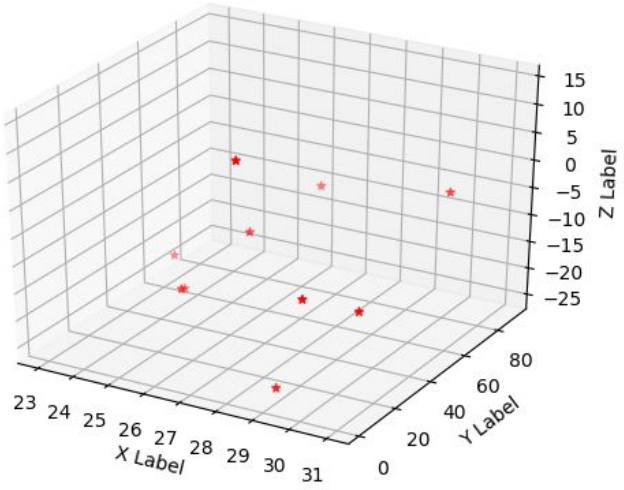
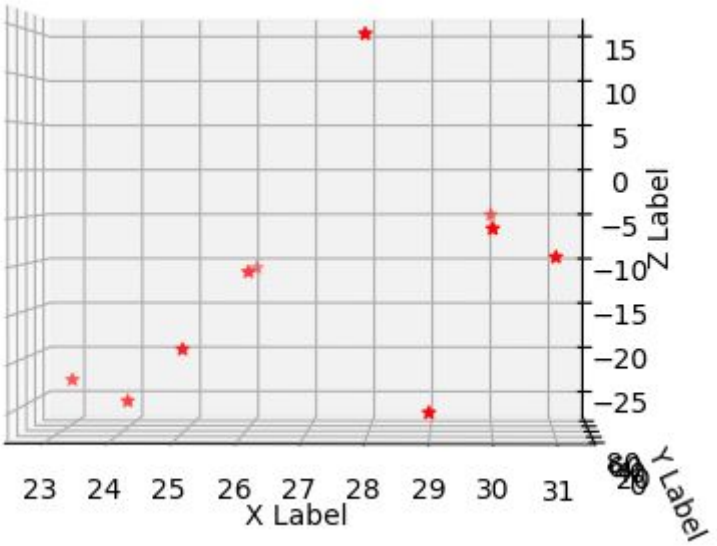


fig.subplots_adjust(hspace=1.0)



<u>TODO 2</u>:
Visualize the 3D plot in part(e) from a different angle.




15
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Z Label
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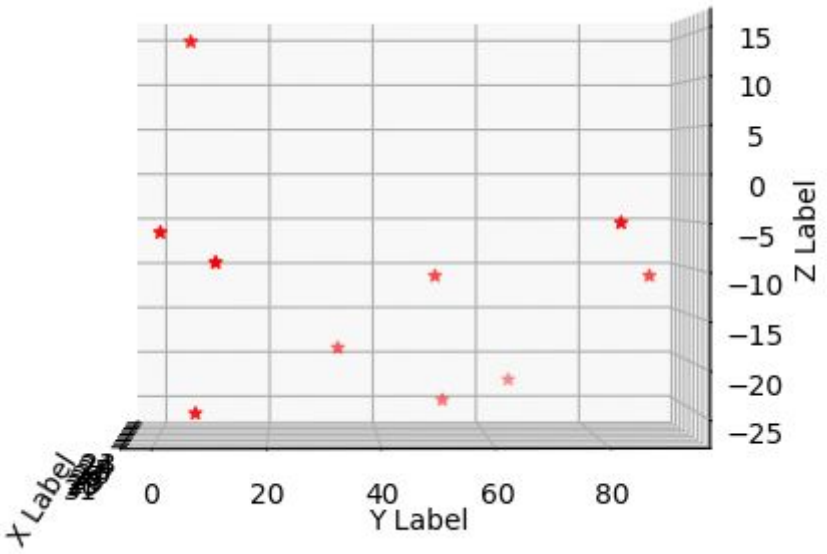
X Label
Y Label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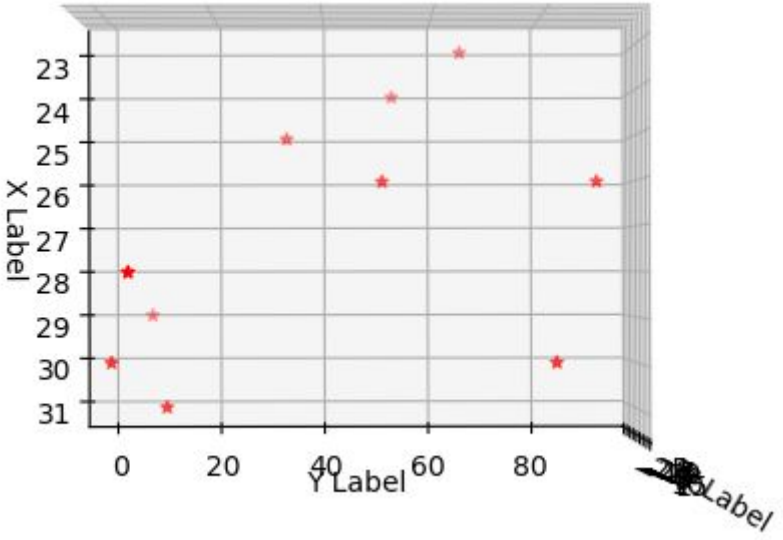
23
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Y Label

Source Code

```
# 3 (a)
import numpy as np
import matplotlib
import matplotlib.pyplot as plt
from mpl_toolkits import mplot3d

# 3 (b) : sample scatter plot
plt.plot([1,2,3,4,5],[1,4,9,16,25])
plt.show()

# 3 (c) Figures and Subplots
t = np.arange(0., 5., 0.2)
fig = plt.figure(figsize=(10,10)) #creating a figure
fig.subplots_adjust(hspace=1.0)

axes_1 = plt.subplot(4,1,1) #first axes in the figure
plt.plot(t, t,'r^',markersize=8,label='line1') #plotting with red marker '^'
legend = plt.legend(loc='upper right', shadow=True, fontsize='x-large') #adding the legend
plt.title('First Plot') #adding the title
plt.xlabel('t') #labeling x axis
plt.ylabel('t') #labeling y axis
plt.xlim([0,10]) #limits of x axis

axes_2 = plt.subplot (4,1,2) #second axes in the figure
plt.plot(t, t**2, 'b*',markersize=8) #plotting
axes_2.set_title('Second Plot') #adding the title
axes_2.set_xlabel('t') #labeling x axis
axes_2.set_ylabel('t^2') #labeling y axis
axes_2.set_ylim([0,40]) #limits of y axis

# 3 (d) Saving plots to file
plt.savefig('plot1.pdf') #saving the plot as a pdf
plt.savefig('plot1.png',dpi=400, bbox_inches ='tight')
plt.savefig('plot1.jpg') #saving the plot as a jpg file
plt.savefig('plot11.jpg', dpi=100, quality=50, optimize=True, progressive=True) #jpg options
plt.show()

# 3 (e) 3D plots
fig = plt.figure() #creating a figure
ax = fig.add_subplot(1,1,1, projection='3d') #creating 3D subplot 311,
xs=([29, 24, 25, 23, 30 ,31, 26, 26, 30, 28])
ys=([ 7, 53 , 33 , 66, 1 ,11, 91, 51, 83, 6])
zs=([-25, -25, -19, -23,-6, -9, -11 , -11,-5, 14])
ax.scatter(xs, ys, zs, c='r', marker='*')
ax.set_xlabel('X Label')
ax.set_ylabel('Y Label')
ax.set_zlabel('Z Label')

plt.show()
```

Lab Excercise

(a), (b)

Please find the file named, 'e15140lab4.py'

(c) Visualize the PCA in a 3D plot with a well-separated class (each class visualizes with different colors). Your figure must contain a title, axis labels, and a legend.