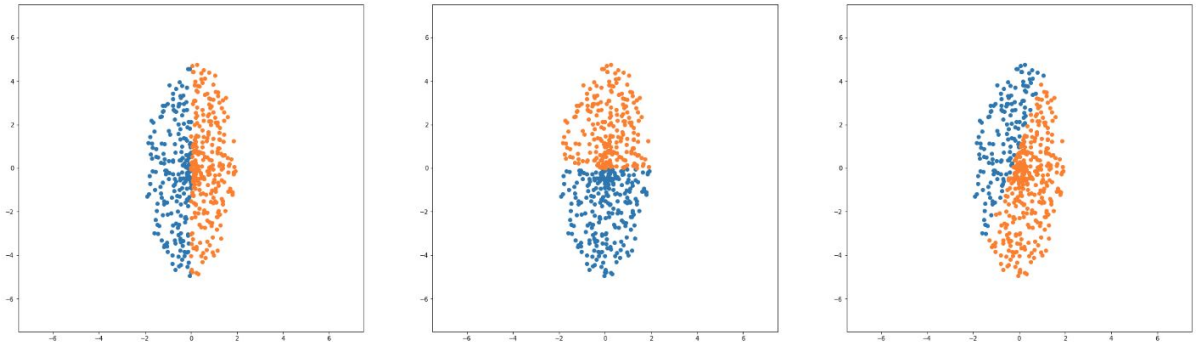
I want to give some clarity and intuition on Dimensionality reduction part of homework.

Creating Datasets

I added an image. That's how your data should look like.



Write PCA function.
Overall, I don't really check which libraries you used. Here, what I mean is, you should implement the algorithm yourself. This is for understanding what happens when you use this function in future.

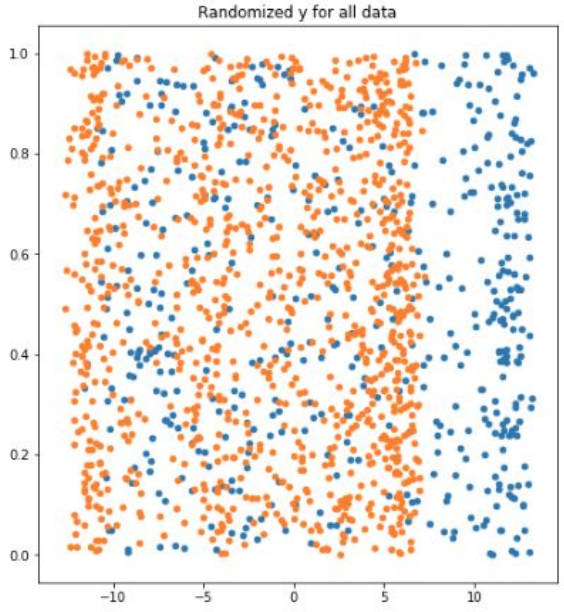
Apply LDA(https://scikit-learn.org/stable/modules/lda_qda.html) to data for each label set. You can use sklearn implementation.
You can also use another LDA implementation if you want. Or you can implement it yourself.

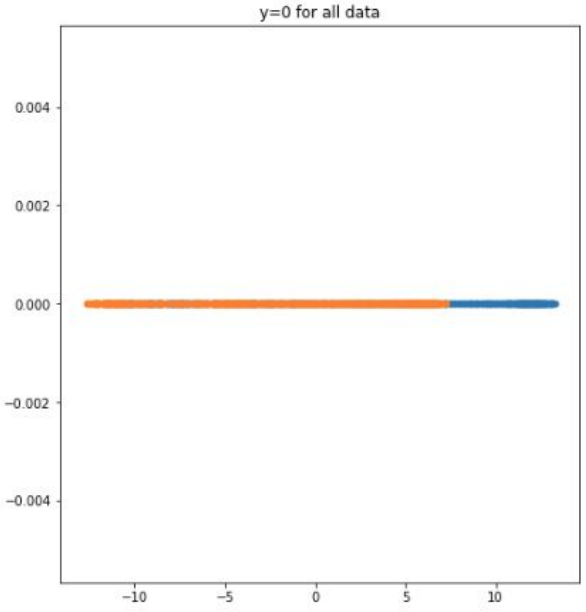
Visualizing Components:

To make your plots more intuitive, plot each component separately.

Understandability of plots is another important thing. While visualization, you should keep this in mind and choose how you are going to present your results.

Example: Since your components are 1D, if you visualize them in plot directly, you can't see where labels overlap.
* I added a figure with 2 plots. I plotted them using plt.scatter. Scatter expect x and y vector. I used the principal component as x vector. For plot 1, I used random y values. For plot 2, I used 0 y values.


Randomized y for all data
1.0
0.8
0.6
0.4
0.2
0.0
−10
−5
0
5
10


y=0 for all data
0.004
0.002
0.000
−0.002
−0.004
−10
−5
0
5
10