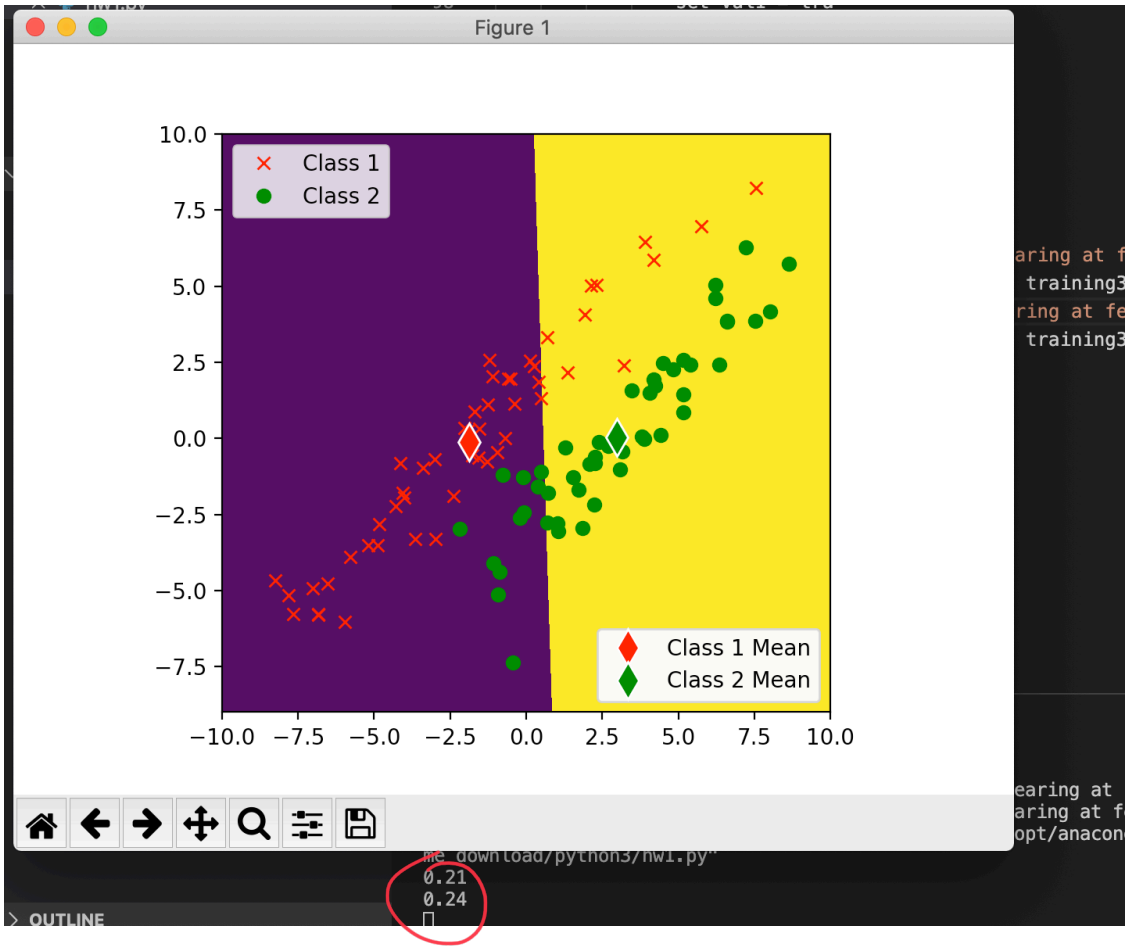
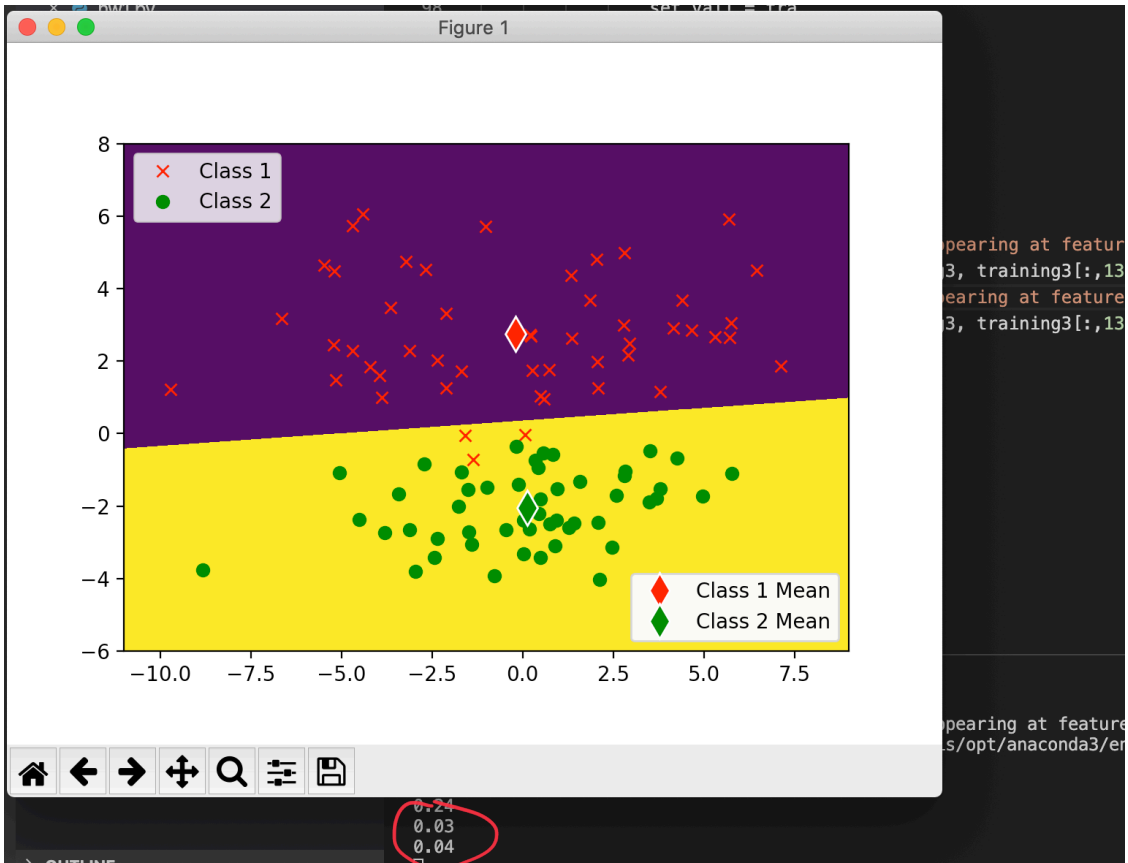
HW1
Question a



In synthetic1,
Training error rate is 0.21 and Testing error rate is 0.24 as shown in red cycle.

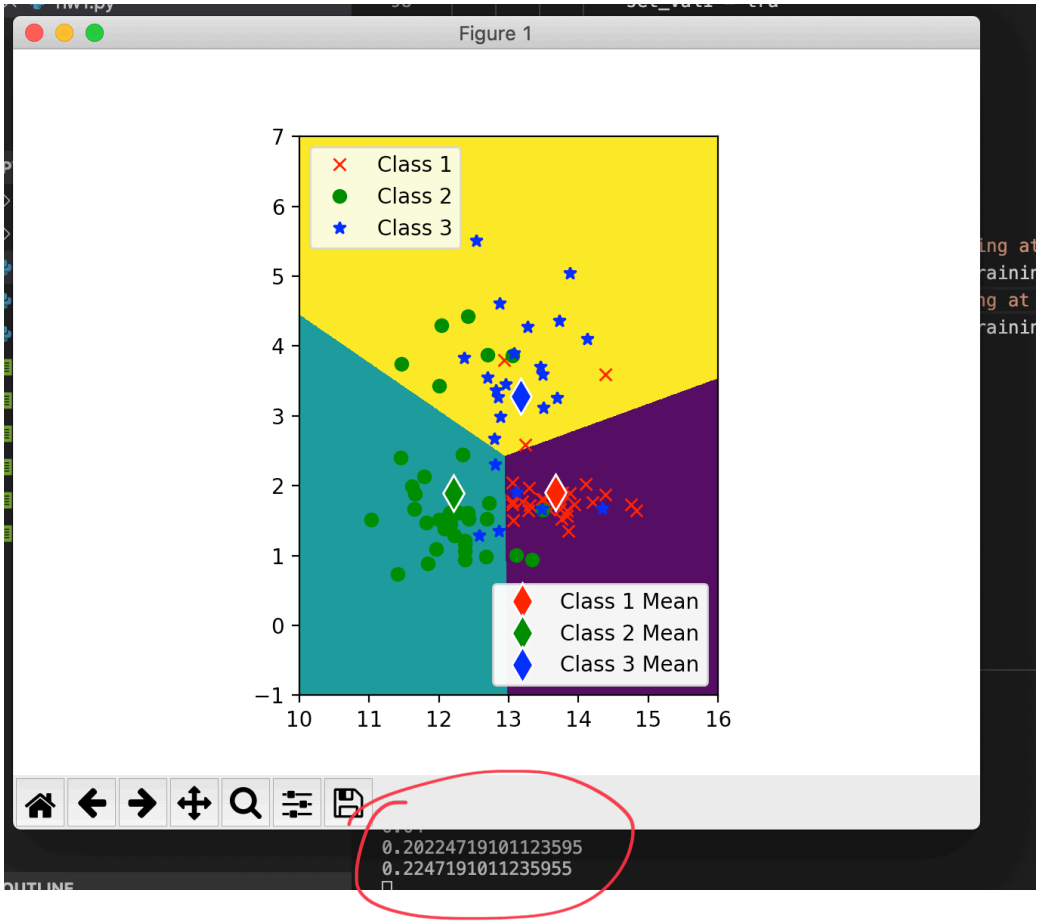


In synthetic2,
Training error rate is 0.03 and Testing error rate is 0.04 as shown in red cycle.

Question b

There is much difference in error rate between the two synthetic datasets.
there are so much data points crossing the decision boundary in synthetic1, on the other hand, there is only 3 data points crossing the decision boundary synthetic2.
From my point of view, because the data points of both two classes in synthetic1 relatively separate in the whole chart, it must has more error points than points in synthetic2. Maybe these two features do not fit for classify these two classes using nearest mean method. Or even Maybe these two features do not relevant to these two classes.

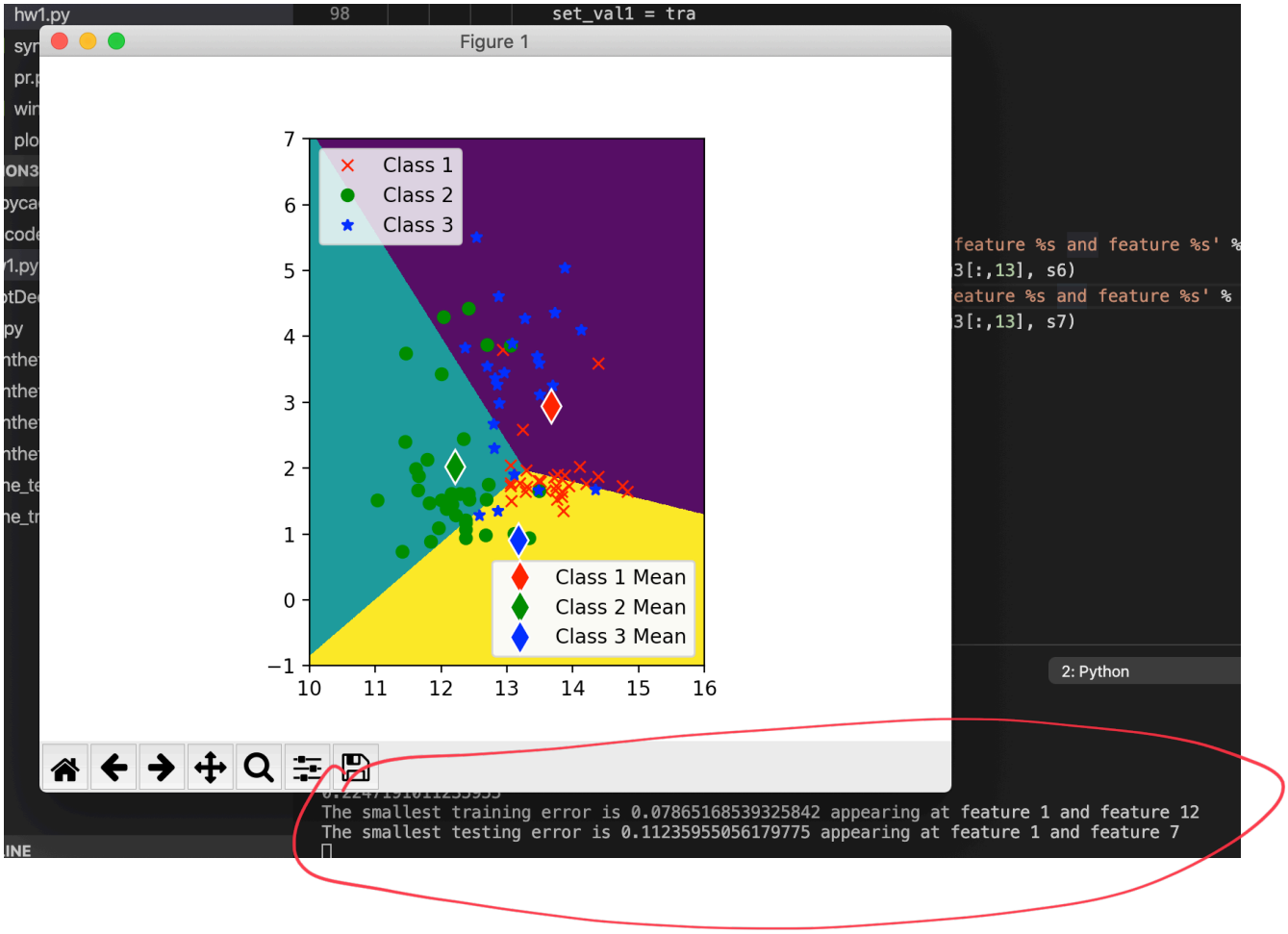
Question c



In question 3,
Training error rate is 0.202247 and Testing error rate is 0.224719 as shown in red cycle.

Question d

I use two for loop, the outer loop traverse i to 1 to 13 (all features) and the inner loop traverse j to i+1 to 13 (features that outer loop did not go through yet) to try every possible solution. In the inner loop, I set initial set_error is 1, if ever current error is smaller than set_error, it becomes the set_error. When the outer loop is finished, the set_error will become the smallest error comparing to other possible solutions.



The smallest training error rate is 0.07865168539325842 appearing at feature 1 and feature 12, its testing error rate is 0.12359550561797752

Question e

Yes.There much difference in both training-set and testing-set error rate for different pairs of features
The smallest training error rate is 0.07865168539325842 appearing at feature 1 and feature 12, its testing error rate is 0.12359550561797752
The biggest training error rate is 0.5730337078651685 appearing at feature 2 and feature 5, its testing error rate is 0.43820224719101125

The smallest testing error rate is 0.11235955056179775 appearing at feature 1 and feature 7, its training error rate is 0.0898876404494382
The biggest testing error rate is 0.5056179775280899 appearing at feature 3 and feature 4, its training error rate is 0.6067415730337079

As these error rates, There much difference in both training-set and testing-set error rate for different pairs of features