ML - EX3

Problem 1:

Lines

```
Running Adaboost using Lines
Empirical Errors: [0.27 0.28 0.24 0.25 0.23 0.23 0.21 0.21]
Actual Errors: [0.36 0.38 0.37 0.37 0.36 0.36 0.36 0.36]
Difference between Actual and Empirical Errors:
[0.09 0.1  0.13 0.12 0.13 0.13 0.15 0.15]
```

Q1 :

While adding rules the empirical error decreases. The actual error gets some slight changes for all 1-8 rules.

Q2 :

Adding more rules increases the difference between the actual error and the empirical error which shows signs of overfitting.
Additionally, the actual errors stay in the same range while the empirical errors decrease.

Problem 2:

Circles

```
Running Adaboost using Circles
Empirical Errors: [0.24 0.28 0.05 0.06 0.03 0.03 0.02 0.02]
Actual Errors: [0.33 0.35 0.14 0.16 0.13 0.12 0.13 0.11]
Difference between Actual and Empirical Errors:
[0.09 0.07 0.09 0.1  0.1  0.09 0.11 0.09]
```

Q1 :

The difference between the actual error and the empirical error is slightly different from the lines. Here the difference is lower and the errors are lower, When rules being added we observed a decrease in the empirical error and actual error.

Q2 :

Adding more rules here did increase the difference between the errors but it improved at the end meaning no signs of overfitting issue.

Q3 :

The difference in the errors is higher with the lines meaning higher overfitting, Additionally the errors are much lower with the circles implying that the circles are a better rules for this data set.