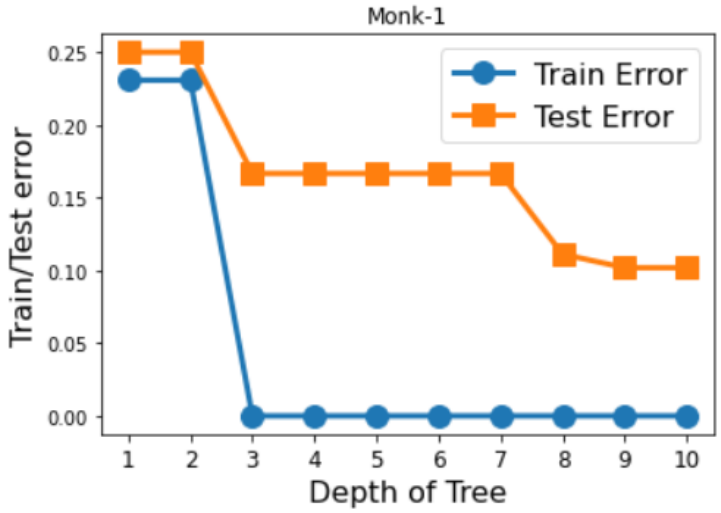
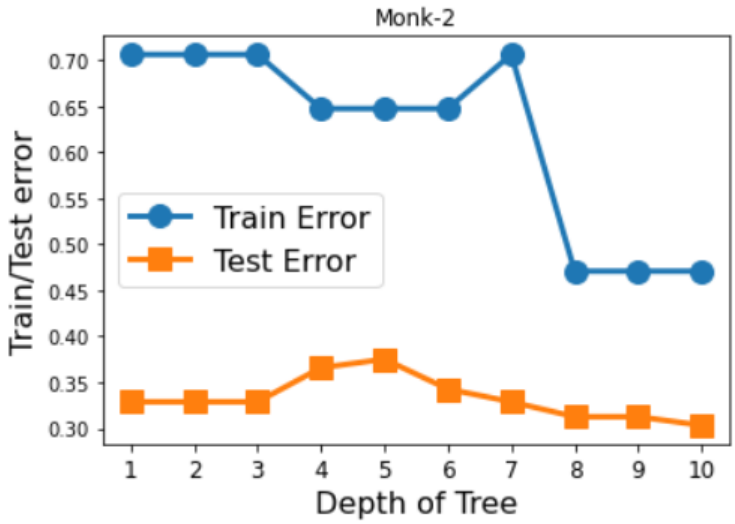
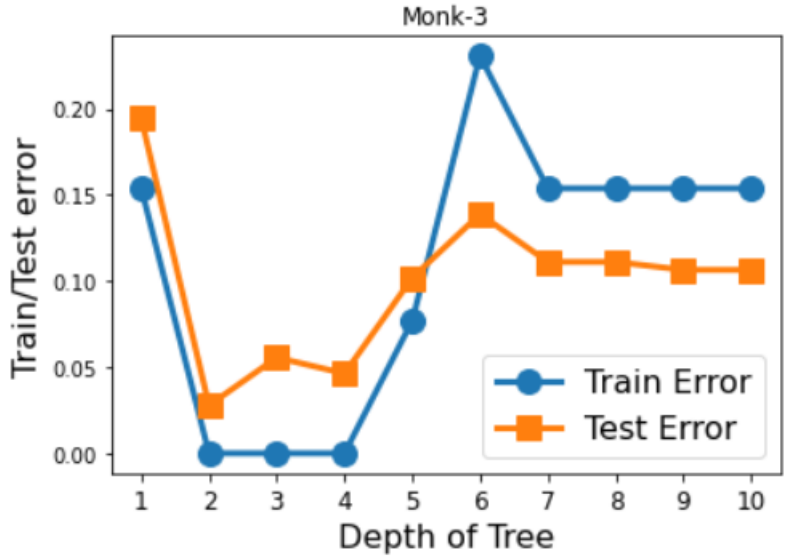
B) Learning Curve

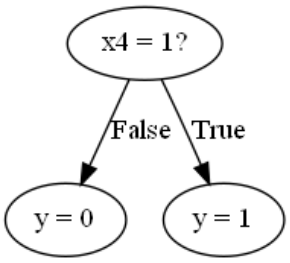






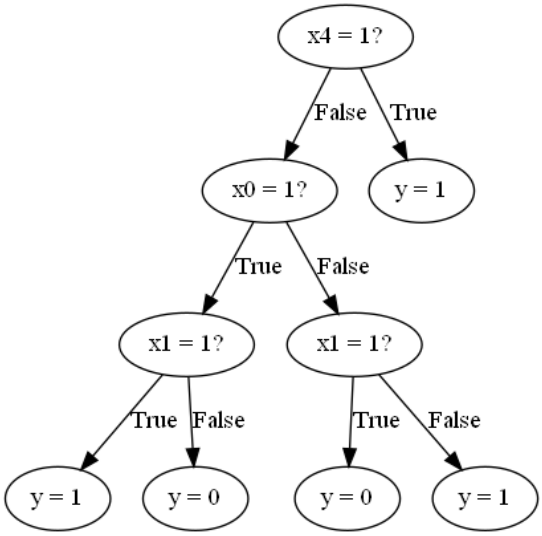
C) Weak Learner

Depth-1



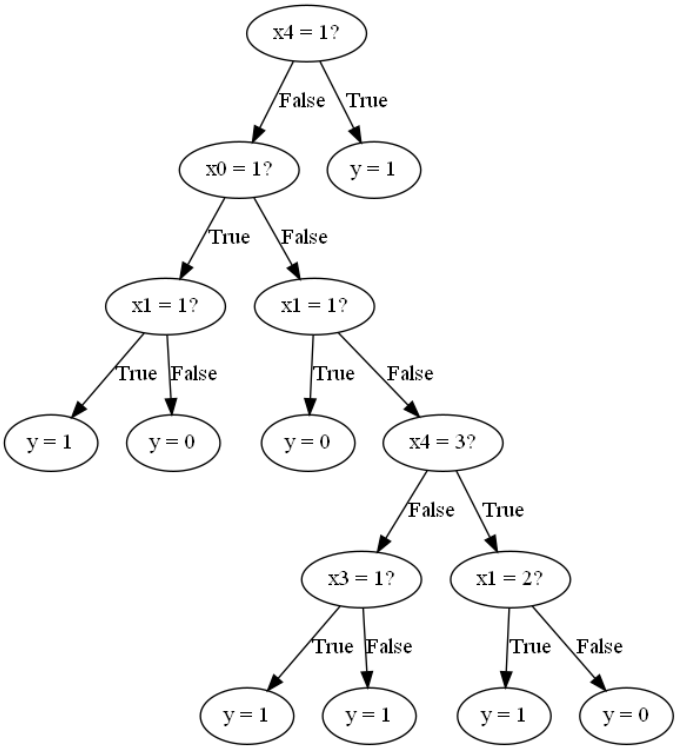

```
Confusion Matrix:
[[216   0]
[108 108]]
Test Error = 25.00%.
```

Depth-3




```
Confusion Matrix:
[[144  72]
[  0 216]]
Test Error = 16.67%.
```

Depth-5

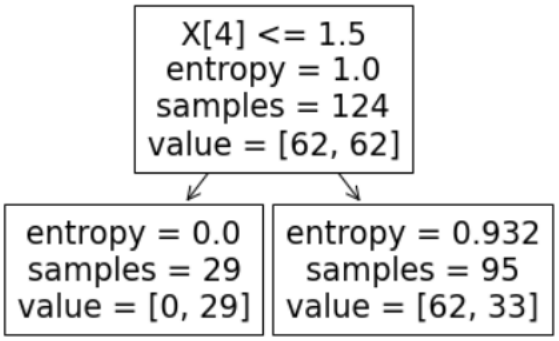



```
Confusion Matrix:
[[156  60]
[ 12 204]]
Test Error = 16.67%.
```

D) scikit-learn Decision Tree

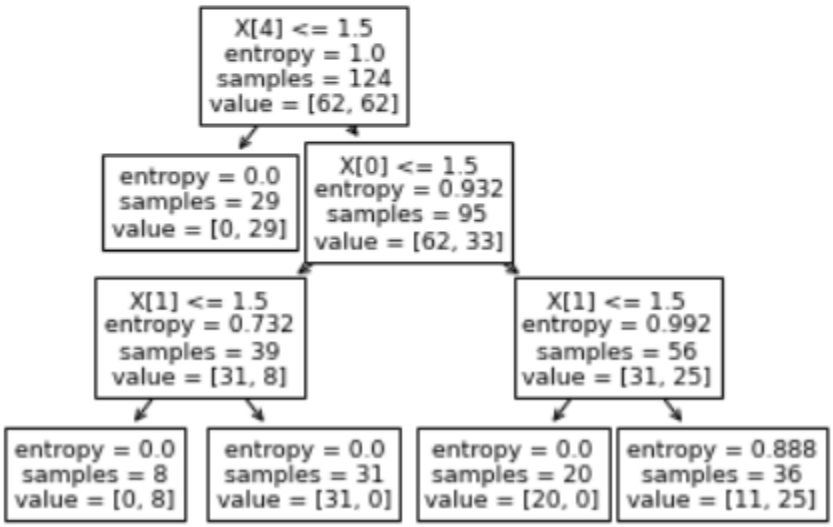
```
For Depth 1
Test Error =  0.75

Confusion Matrix:
 [[216   0]
 [108 108]]
```



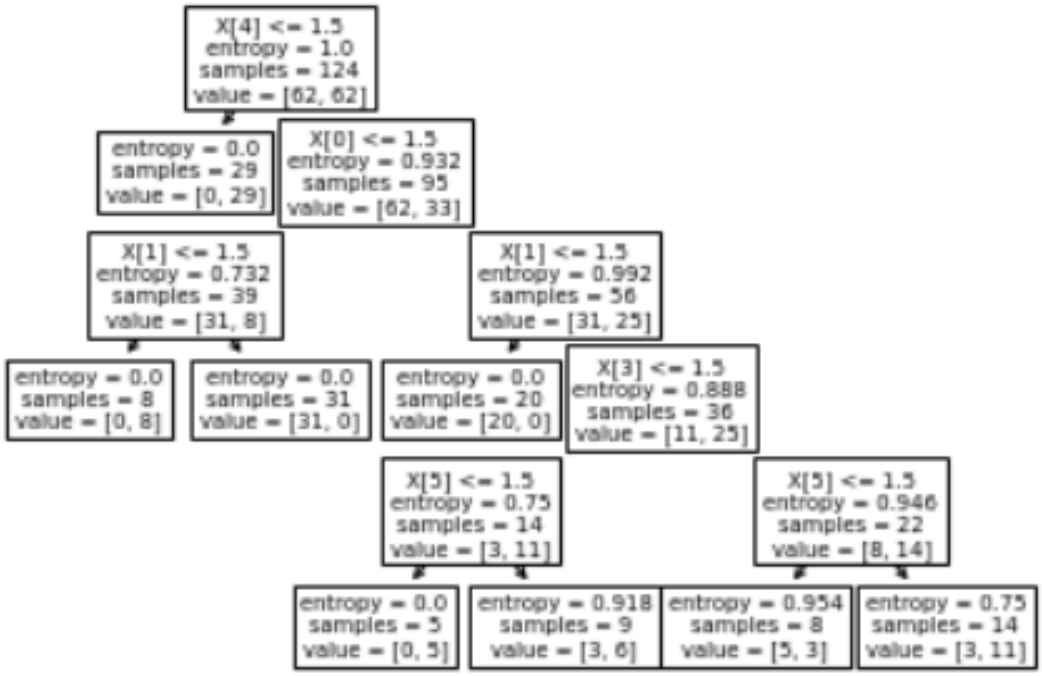

```
For Depth 3
Test Error =  0.8333333333333334

Confusion Matrix:
 [[144  72]
 [  0 216]]
```



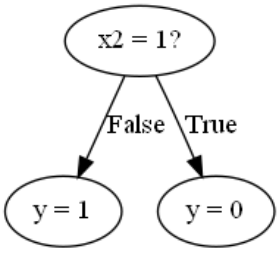
```
For Depth 5
Test Error =  0.8333333333333334

Confusion Matrix:
 [[168  48]
 [ 24 192]]
```



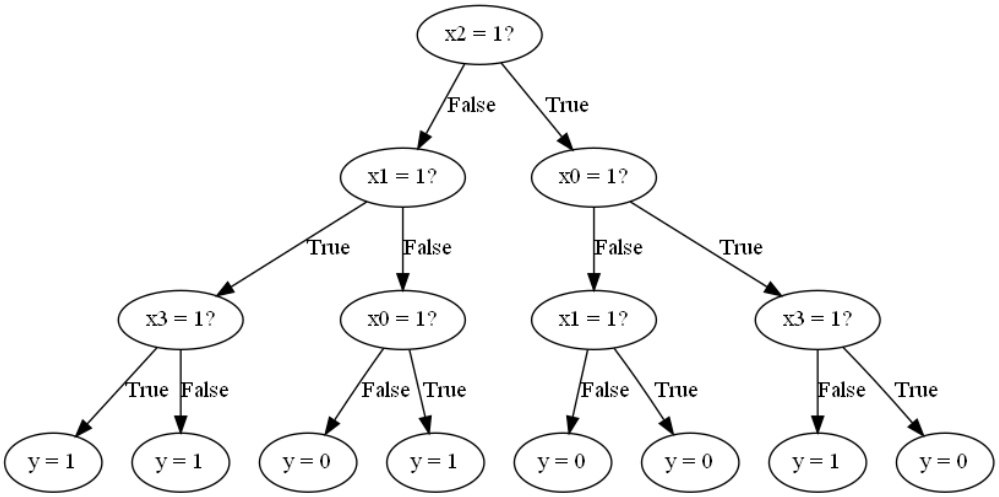
E) Other Data Sets

On Own Id3 Depth-1



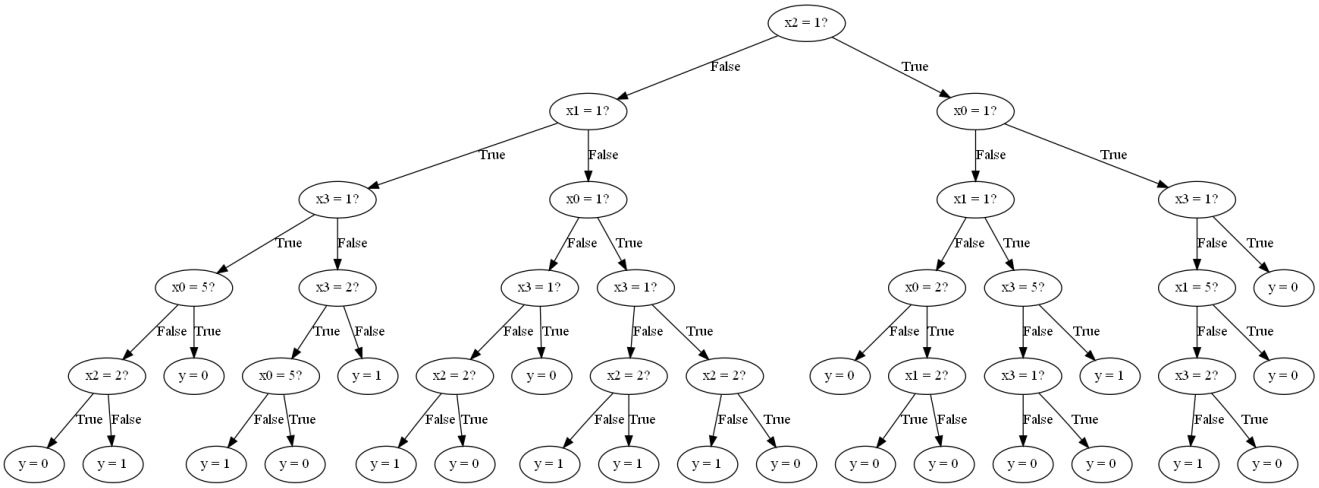

```
Confusion Matrix:
 [[24 57]
 [ 5 87]]
Test Error = 35.84%.
```

On Own Id3 Depth-3



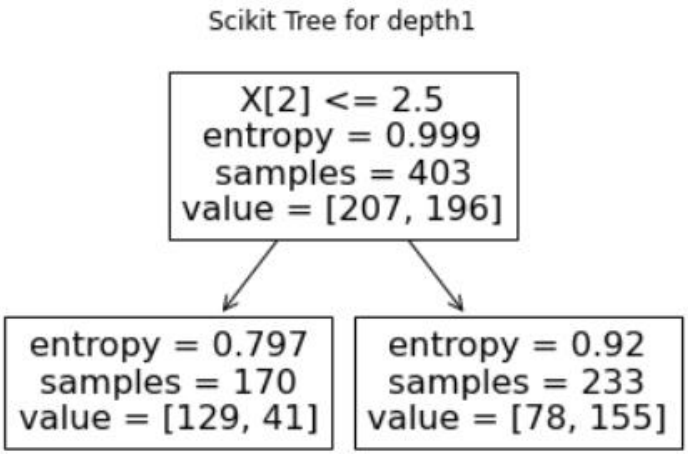

```
Confusion Matrix:
 [[76  5]
 [36 56]]
Test Error = 23.70%.
```

On Own Id3 Depth-5




```
Confusion Matrix:
 [[58 23]
 [ 9 83]]
Test Error = 18.50%.
```

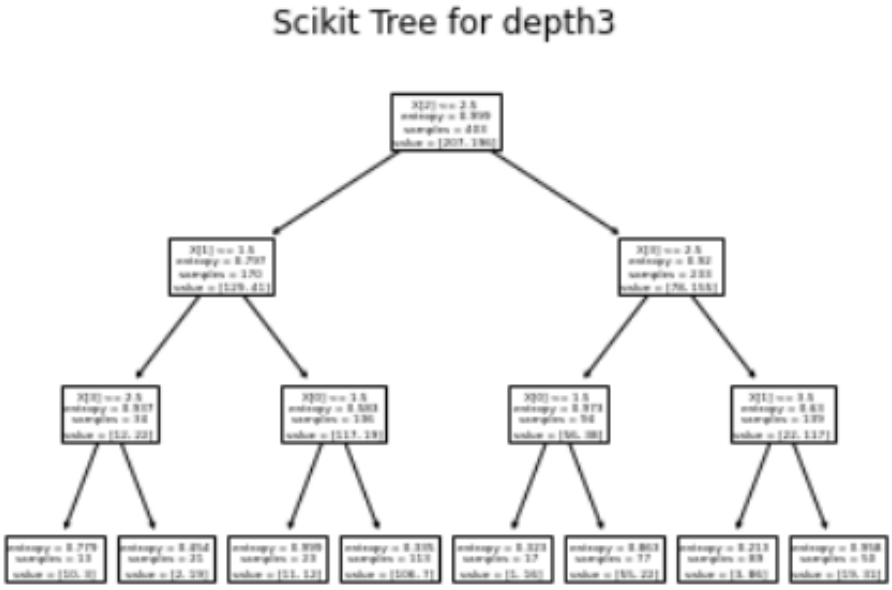
On Own Sklearn Depth-1




```
 Through scikit learn
Confusion Matrix:
 [[40 41]
 [19 73]]

Test Error =  0.653179190751445
```

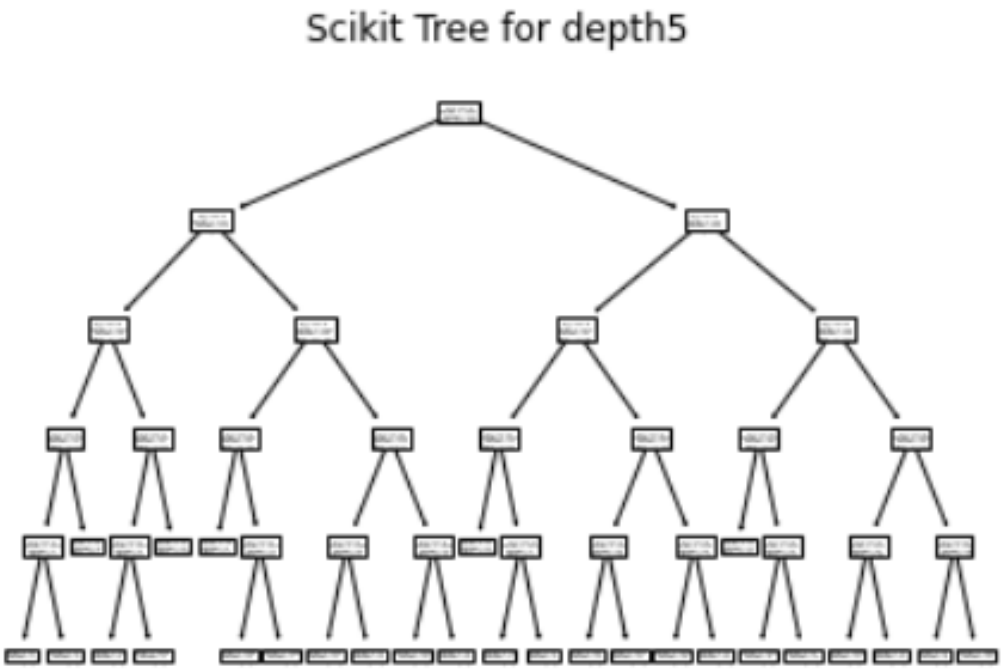
On Own Sklearn Depth-3




```
 Through scikit learn
Confusion Matrix:
 [[62 19]
 [13 79]]

Test Error =  0.815028901734104
```

On Own Sklearn Depth-5




```
 Through scikit learn
Confusion Matrix:
 [[75  6]
 [14 78]]

Test Error =  0.884393063583815
```

The scikit learn algorithm improves with more depth in decision tree, as with depth 3 the test error of Our Id3 algorithm and scikit learns is nearly same but with more depth the difference is slighly more than that of depth 3.