Discrete-event Simulation Assignment 2

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Notes: The Confusion Matrix for each perceptron is formatted in the same way as the one generated by the code in the previous assignment. I wasn't able to figure out how to label them in a reasonable fashion in LaTeX. I ran the training data until I reach an epoch that failed to improve the training accuracy over the previous cycle. Additional cycles do occasionally produce improvements, but this method seemed the easiest to manage and apply consistently.

Learning Rate 0.20: Data from the training and testing.

Perceptron 0 1 Perceptron 0 2

Perceptron	0	1
Number of Epochs		6
Training Accuracy		1.000
Test Accuracy		0.984
Confusion Matrix	91	0
	3	92
Perceptron	0	3
Number of Epochs		5
Training Accuracy		1.000
Test Accuracy		0.985
Confusion Matrix	105	0
	3	92
Perceptron	0	5
Number of Epochs		5
Training Accuracy		0.990
Test Accuracy		0.896
Confusion Matrix	88	0
	19	76

Perceptron	U	2
Number of Epochs		7
Training Accuracy		1.000
Test Accuracy		1.000
Confusion Matrix	94	0
	0	95
Perceptron	0	4
Number of Epochs		5
Training Accuracy		0.990
Test Accuracy		0.905
Confusion Matrix	84	0
	17	78
Perceptron	0	6
Number of Epochs		6
Training Accuracy		1.000
Test Accuracy		0.989
Confusion Matrix	89	2
	0	95

Perceptron	0	7
Number of Epochs		5
Training Accuracy		1.000
Test Accuracy		0.984
Confusion Matrix	94	0
	3	92
Perceptron	0	9
Number of Epochs		5
Training Accuracy		1.000
Test Accuracy		0.980
Confusion Matrix	104	0
	4	91
Perceptron	1	3
Number of Epochs		6
Training Accuracy		1.000
Test Accuracy		0.990
Confusion Matrix	105	0
	2	89
Perceptron	1	5
Number of Epochs		5
Training Accuracy		0.990
Test Accuracy		0.542
Confusion Matrix	88	0
	82	9
Perceptron	1	7
Number of Epochs		5
Training Accuracy		0.991
Test Accuracy		0.903
Confusion Matrix	94	0
	18	73
Perceptron	1	9
Number of Epochs		6
Training Accuracy		0.990
Test Accuracy		0.656
Confusion Matrix	104	0
	67	24

Perceptron	0	8
Number of Epochs		5
Training Accuracy		0.989
Test Accuracy		0.923
Confusion Matrix	88	0
	14	81
Perceptron	1	2
Number of Epochs		5
Training Accuracy		0.990
Test Accuracy		0.935
Confusion Matrix	94	0
	12	79
Perceptron	1	4
Number of Epochs		5
Training Accuracy		0.990
Test Accuracy		0.480
Confusion Matrix	84	0
	91	0
Perceptron	1	6
Number of Epochs		5
Training Accuracy		0.991
Test Accuracy		0.984
Confusion Matrix	89	2
	1	90
Perceptron	1	8
Number of Epochs		5
Training Accuracy		0.000
Haining Meetiney		0.980
Test Accuracy		$0.980 \\ 0.575$
	88	
Test Accuracy	88 76	0.575
Test Accuracy		0.575
Test Accuracy Confusion Matrix	76	0.575 0 15
Test Accuracy Confusion Matrix Perceptron	76	0.575 0 15
Test Accuracy Confusion Matrix Perceptron Number of Epochs	76	0.575 0 15 3 5
Test Accuracy Confusion Matrix Perceptron Number of Epochs Training Accuracy	76	0.575 0 15 3 5 0.990

Number of Epochs 1.000 Training Accuracy 1.000 Test Accuracy 0.994 Confusion Matrix 83 1 Perceptron 2 6 Number of Epochs 5 5 Training Accuracy 0.990 1.000 Confusion Matrix 91 0 Perceptron 2 8 Number of Epochs 5 5 Training Accuracy 0.990 64 Perceptron 3 0.835 Confusion Matrix 88 0 Perceptron 3 4 Number of Epochs 5 5 Training Accuracy 1.000 105 Perceptron 3 6 Number of Epochs 5 5 Training Accuracy 1.000 105 Perceptron 3 6 Number of Epochs 5 5 Training Accuracy 0.995 Confusion Matrix 90 1	Perceptron	2	4
Test Accuracy 0.994 Confusion Matrix 83 1 Perceptron 2 6 Number of Epochs 5 5 Training Accuracy 0.990 1.000 Confusion Matrix 91 0 Perceptron 2 8 Number of Epochs 5 5 Training Accuracy 0.990 64 Perceptron 3 4 Number of Epochs 5 5 Training Accuracy 0.835 6 Perceptron 3 4 Number of Epochs 5 5 Training Accuracy 1.000 105 Perceptron 3 6 Number of Epochs 5 5 Training Accuracy 1.000 105 Perceptron 3 6 Number of Epochs 5 5 Training Accuracy 0.995 1 Confusion Matrix 90 1 Perceptron 3 <td>Number of Epochs</td> <td></td> <td>6</td>	Number of Epochs		6
Confusion Matrix 83 1 Perceptron 2 6 Number of Epochs 5 5 Training Accuracy 0.990 1.000 Confusion Matrix 91 0 Perceptron 2 8 Number of Epochs 5 5 Training Accuracy 0.990 64 Perceptron 3 4 Number of Epochs 5 5 Training Accuracy 0.835 64 Perceptron 3 4 Number of Epochs 5 1.000 Test Accuracy 0.979 0.979 Confusion Matrix 80 4 Derceptron 3 6 Number of Epochs 5 5 Training Accuracy 1.000 105 Perceptron 3 6 Number of Epochs 5 1 Training Accuracy 0.995 0.995 Confusion Matrix 90 1 Dercept	Training Accuracy		1.000
Perceptron 2 6 Number of Epochs 5 5 Training Accuracy 0.990 1.000 Confusion Matrix 91 0 Perceptron 2 8 Number of Epochs 5 5 Training Accuracy 0.990 64 Perceptron 3 0.835 Confusion Matrix 88 0 Perceptron 3 4 Number of Epochs 5 1.000 Test Accuracy 0.979 0.979 Confusion Matrix 80 4 0 105 0.979 Perceptron 3 6 Number of Epochs 5 1.000 Test Accuracy 0.995 0.995 Confusion Matrix 90 1 Perceptron 3 8 Number of Epochs 5 1.000 Test Accuracy 0.995 0.995 Confusion Matrix 90 1 Perceptron	Test Accuracy		0.994
Perceptron 2 6 Number of Epochs 5 Training Accuracy 0.990 Test Accuracy 1.000 Confusion Matrix 91 0 Perceptron 2 8 Number of Epochs 5 5 Training Accuracy 0.990 0.835 Confusion Matrix 88 0 Perceptron 3 4 Number of Epochs 5 5 Training Accuracy 1.000 0.979 Confusion Matrix 80 4 0 105 0 105 Perceptron 3 6 Number of Epochs 5 5 Training Accuracy 1.000 105 Perceptron 3 6 Number of Epochs 5 1 Training Accuracy 0.995 0.995 Confusion Matrix 90 1 Perceptron 3 8 Number of Epochs 5	Confusion Matrix	83	1
Number of Epochs 5 Training Accuracy 0.990 Test Accuracy 1.000 Confusion Matrix 91 0 Perceptron 2 8 Number of Epochs 5 5 Training Accuracy 0.835 0 Confusion Matrix 88 0 Perceptron 3 4 Number of Epochs 5 5 Training Accuracy 1.000 100 Test Accuracy 0.979 0.979 Confusion Matrix 80 4 Derceptron 3 6 Number of Epochs 5 Training Accuracy 1.000 Test Accuracy 0.995 Confusion Matrix 90 1 Derceptron 3 8 Number of Epochs 5 Training Accuracy 0.995 Test Accuracy 0.989 Test Accuracy 0.989 Confusion Matrix 88 0		0	94
Training Accuracy 0.990 Test Accuracy 1.000 Confusion Matrix 91 0 Perceptron 2 8 Number of Epochs 5 5 Training Accuracy 0.990 0.835 Confusion Matrix 88 0 Perceptron 3 4 Number of Epochs 5 1.000 Test Accuracy 0.979 0.979 Confusion Matrix 80 4 0 105 0 Perceptron 3 6 Number of Epochs 5 5 Training Accuracy 1.000 105 Perceptron 3 6 Number of Epochs 5 1 Training Accuracy 0.995 0.995 Confusion Matrix 90 1 Perceptron 3 8 Number of Epochs 5 5 Training Accuracy 0.989 0.989 Test Accuracy 0.896	Perceptron	2	6
Test Accuracy 1.000 Confusion Matrix 91 0 Perceptron 2 8 Number of Epochs 5 5 Training Accuracy 0.835 0.835 Confusion Matrix 88 0 Confusion Matrix 30 64 Perceptron 3 4 Number of Epochs 5 1.000 Test Accuracy 0.979 0.979 Confusion Matrix 80 4 Derceptron 3 6 Number of Epochs 5 5 Training Accuracy 1.000 105 Perceptron 3 8 Number of Epochs 5 1 Training Accuracy 0.995 0.995 Perceptron 3 8 Number of Epochs 5 5 Training Accuracy 0.989 0.989 Test Accuracy 0.896 0.896 Confusion Matrix 88 0	Number of Epochs		5
Confusion Matrix 91 0 Perceptron 2 8 Number of Epochs 5 Training Accuracy 0.990 Test Accuracy 0.835 Confusion Matrix 88 0 Perceptron 3 4 Number of Epochs 5 5 Training Accuracy 1.000 105 Perceptron 3 6 Number of Epochs 5 5 Training Accuracy 1.000 105 Perceptron 3 6 Number of Epochs 5 1.000 Test Accuracy 0.995 1 Confusion Matrix 90 1 Perceptron 3 8 Number of Epochs 5 Training Accuracy 0.989 Test Accuracy 0.989 Test Accuracy 0.896 Confusion Matrix 88 0	Training Accuracy		0.990
Perceptron 2 8 Number of Epochs 5 Training Accuracy 0.990 Test Accuracy 0.835 Confusion Matrix 88 0 Perceptron 3 4 Number of Epochs 1.000 5 Training Accuracy 0.979 0.979 Confusion Matrix 80 4 0 105 5 Perceptron 3 6 Number of Epochs 5 5 Training Accuracy 1.000 1 Test Accuracy 0.995 0.995 Confusion Matrix 90 1 Desceptron 3 8 Number of Epochs 5 5 Training Accuracy 0.989 5 Training Accuracy 0.896 0.896 Confusion Matrix 88 0	Test Accuracy		1.000
Perceptron 2 8 Number of Epochs 5 Training Accuracy 0.990 Test Accuracy 0.835 Confusion Matrix 88 0 A Securacy 30 64 Perceptron 3 4 Number of Epochs 5 1.000 Test Accuracy 0.979 0.979 Confusion Matrix 80 4 0 105 0 Perceptron 3 6 Number of Epochs 5 1.000 Test Accuracy 0.995 Confusion Matrix 90 1 Perceptron 3 8 Number of Epochs 5 Training Accuracy 0.989 Test Accuracy 0.989 Test Accuracy 0.896 Confusion Matrix 88 0	Confusion Matrix	91	0
Number of Epochs 5 Training Accuracy 0.990 Test Accuracy 0.835 Confusion Matrix 88 0 Perceptron 3 4 Number of Epochs 5 5 Training Accuracy 1.000 1.000 Test Accuracy 0.979 0.979 Confusion Matrix 80 4 Number of Epochs 5 5 Training Accuracy 1.000 1 Test Accuracy 0.995 1 Confusion Matrix 90 1 Perceptron 3 8 Number of Epochs 5 Training Accuracy 0.989 Test Accuracy 0.989 Test Accuracy 0.896 Confusion Matrix 88 0		0	94
Training Accuracy 0.990 Test Accuracy 0.835 Confusion Matrix 88 0 30 64 Perceptron 3 4 Number of Epochs 5 1.000 Test Accuracy 0.979 0.979 Confusion Matrix 80 4 0 105 0 Perceptron 3 6 Number of Epochs 5 1.000 Test Accuracy 0.995 0.995 Confusion Matrix 90 1 Perceptron 3 8 Number of Epochs 5 Training Accuracy 0.989 Test Accuracy 0.989 Test Accuracy 0.896 Confusion Matrix 88 0		2	8
Test Accuracy 0.835 Confusion Matrix 88 0 30 64 Perceptron 3 4 Number of Epochs 5 5 Training Accuracy 1.000 1.000 Test Accuracy 80 4 Confusion Matrix 80 4 Number of Epochs 5 5 Training Accuracy 1.000 1 Test Accuracy 0.995 1 Confusion Matrix 90 1 Perceptron 3 8 Number of Epochs 5 5 Training Accuracy 0.989 0.896 Test Accuracy 0.896 0.896 Confusion Matrix 88 0	Number of Epochs		5
Confusion Matrix 88 0 30 64 Perceptron 3 4 Number of Epochs 5 Training Accuracy 1.000 Test Accuracy 0.979 Confusion Matrix 80 4 0 105 Perceptron 3 6 Number of Epochs 5 Training Accuracy 1.000 Test Accuracy 0.995 Confusion Matrix 90 1 Number of Epochs 5 Training Accuracy 0.989 Test Accuracy 0.896 Confusion Matrix 88 0	_		0.990
Perceptron 3 4 Number of Epochs 5 Training Accuracy 1.000 Test Accuracy 0.979 Confusion Matrix 80 4 0 105 Perceptron 3 6 Number of Epochs 5 1.000 Test Accuracy 0.995 0.995 Confusion Matrix 90 1 Perceptron 3 8 Number of Epochs 5 5 Training Accuracy 0.989 5 Training Accuracy 0.896 0.896 Confusion Matrix 88 0	· ·		0.835
Perceptron 3 4 Number of Epochs 5 Training Accuracy 1.000 Test Accuracy 0.979 Confusion Matrix 80 4 0 105 Perceptron 3 6 Number of Epochs 5 Training Accuracy 1.000 Test Accuracy 0.995 Confusion Matrix 90 1 Perceptron 3 8 Number of Epochs 5 5 Training Accuracy 0.989 Test Accuracy 0.896 Confusion Matrix 88 0	Confusion Matrix		0
Number of Epochs 5 Training Accuracy 1.000 Test Accuracy 0.979 Confusion Matrix 80 4 0 105 Perceptron 3 6 Number of Epochs 5 Training Accuracy 1.000 Test Accuracy 0.995 Confusion Matrix 90 1 0 105 Perceptron 3 8 Number of Epochs 5 Training Accuracy 0.989 Test Accuracy 0.896 Confusion Matrix 88 0		30	64
Training Accuracy 1.000 Test Accuracy 0.979 Confusion Matrix 80 4 0 105 Perceptron 3 6 Number of Epochs 5 Training Accuracy 1.000 Test Accuracy 0.995 Confusion Matrix 90 1 Perceptron 3 8 Number of Epochs 5 Training Accuracy 0.989 Test Accuracy 0.896 Confusion Matrix 88 0		3	4
Test Accuracy 0.979 Confusion Matrix 80 4 0 105 Perceptron 3 6 Number of Epochs 5 5 Training Accuracy 1.000 0.995 Confusion Matrix 90 1 Perceptron 3 8 Number of Epochs 5 5 Training Accuracy 0.989 Test Accuracy 0.896 Confusion Matrix 88 0			
Confusion Matrix 80 4 Perceptron 3 6 Number of Epochs 5 Training Accuracy 1.000 Test Accuracy 0.995 Confusion Matrix 90 1 Perceptron 3 8 Number of Epochs 5 5 Training Accuracy 0.989 0.896 Test Accuracy 0.896 0.896 Confusion Matrix 88 0	_		
Perceptron 3 6 Number of Epochs 1.000 Training Accuracy 1.000 Test Accuracy 0.995 Confusion Matrix 90 1 Perceptron 3 8 Number of Epochs 5 5 Training Accuracy 0.989 0.896 Test Accuracy 88 0			0.979
Perceptron 3 6 Number of Epochs 5 Training Accuracy 1.000 Test Accuracy 0.995 Confusion Matrix 90 1 0 105 Perceptron 3 8 Number of Epochs 5 Training Accuracy 0.989 Test Accuracy 0.896 Confusion Matrix 88 0	Confusion Matrix	80	4
Number of Epochs5Training Accuracy1.000Test Accuracy0.995Confusion Matrix9010105Perceptron38Number of Epochs5Training Accuracy0.989Test Accuracy0.896Confusion Matrix880		0	105
Training Accuracy 1.000 Test Accuracy 0.995 Confusion Matrix 90 1 0 105 Perceptron 3 8 Number of Epochs 5 Training Accuracy 0.989 Test Accuracy 0.896 Confusion Matrix 88 0	Perceptron	3	6
Test Accuracy 0.995 Confusion Matrix 90 1 0 105 Perceptron 3 8 Number of Epochs Training Accuracy 0.989 Test Accuracy 0.896 Confusion Matrix 88 0	Number of Epochs		5
Confusion Matrix9010105Perceptron38Number of Epochs5Training Accuracy0.989Test Accuracy0.896Confusion Matrix880	Training Accuracy		1.000
Perceptron38Number of Epochs5Training Accuracy0.989Test Accuracy0.896Confusion Matrix880	·		0.995
Perceptron38Number of Epochs5Training Accuracy0.989Test Accuracy0.896Confusion Matrix880	Confusion Matrix	90	1
Number of Epochs Training Accuracy Test Accuracy Confusion Matrix 5 0.989 0.896		0	105
Training Accuracy 0.989 Test Accuracy 0.896 Confusion Matrix 88 0		3	
Test Accuracy 0.896 Confusion Matrix 88 0			5
Confusion Matrix 88 0			
	e e		0.896
20 85	Confusion Matrix	ļ	v
		20	85

Perceptron	2	5
Number of Epochs		5
Training Accuracy		0.990
Test Accuracy		0.505
Confusion Matrix	88	0
	90	4
Perceptron	2	7
Number of Epochs		5
Training Accuracy		1.000
Test Accuracy		0.979
Confusion Matrix	94	0
	4	90
Perceptron	2	9
Number of Epochs		6
Training Accuracy		0.990
Test Accuracy		0.707
Confusion Matrix	104	0
	58	36
	90	30
Perceptron	3	5
Number of Epochs		
_		5
Number of Epochs		5 5
Number of Epochs Training Accuracy		5 5 0.984
Number of Epochs Training Accuracy Test Accuracy	3	5 5 0.984 0.513
Number of Epochs Training Accuracy Test Accuracy	3 88	5 5 0.984 0.513 0
Number of Epochs Training Accuracy Test Accuracy Confusion Matrix	3 88 94	5 5 0.984 0.513 0 11
Number of Epochs Training Accuracy Test Accuracy Confusion Matrix Perceptron	3 88 94	5 0.984 0.513 0 11
Number of Epochs Training Accuracy Test Accuracy Confusion Matrix Perceptron Number of Epochs	3 88 94	5 5 0.984 0.513 0 11 7 5
Number of Epochs Training Accuracy Test Accuracy Confusion Matrix Perceptron Number of Epochs Training Accuracy	3 88 94	5 0.984 0.513 0 11 7 5 0.990
Number of Epochs Training Accuracy Test Accuracy Confusion Matrix Perceptron Number of Epochs Training Accuracy Test Accuracy	3 88 94 3	5 0.984 0.513 0 11 7 5 0.990 1.000
Number of Epochs Training Accuracy Test Accuracy Confusion Matrix Perceptron Number of Epochs Training Accuracy Test Accuracy Confusion Matrix Perceptron	3 88 94 3	5 0.984 0.513 0 11 7 5 0.990 1.000 0
Number of Epochs Training Accuracy Test Accuracy Confusion Matrix Perceptron Number of Epochs Training Accuracy Test Accuracy Confusion Matrix Perceptron Number of Epochs	3 88 94 3 94 0	5 0.984 0.513 0 11 7 5 0.990 1.000 0 105
Number of Epochs Training Accuracy Test Accuracy Confusion Matrix Perceptron Number of Epochs Training Accuracy Test Accuracy Confusion Matrix Perceptron Number of Epochs Training Accuracy	3 88 94 3 94 0	5 0.984 0.513 0 11 7 5 0.990 1.000 0 105 9 5 0.990
Number of Epochs Training Accuracy Test Accuracy Confusion Matrix Perceptron Number of Epochs Training Accuracy Test Accuracy Confusion Matrix Perceptron Number of Epochs	3 88 94 3 94 0	5 0.984 0.513 0 11 7 5 0.990 1.000 0 105
Number of Epochs Training Accuracy Test Accuracy Confusion Matrix Perceptron Number of Epochs Training Accuracy Test Accuracy Confusion Matrix Perceptron Number of Epochs Training Accuracy	3 88 94 3 94 0	5 0.984 0.513 0 11 7 5 0.990 1.000 0 105 9 5 0.990

Perceptron	4	5
Number of Epochs		5
Training Accuracy		0.990
Test Accuracy		0.808
Confusion Matrix	88	0
	33	51
Perceptron	4	7
Number of Epochs		6
Training Accuracy		0.990
Test Accuracy		0.781
Confusion Matrix	94	0
	39	45
Perceptron	4	9
Number of Epochs		5
Training Accuracy		0.990
Test Accuracy		0.612
Confusion Matrix	104	0
	73	11
Perceptron	5	7
Number of Epochs		6
Training Accuracy		1.000
Test Accuracy		1.000
Confusion Matrix	94	0
	0	88
Perceptron	5	9
Number of Epochs		5
Training Accuracy		0.990
Test Accuracy		0.568
Confusion Matrix	104	0
	83	5
Perceptron	6	8
Number of Epochs		6
Training Accuracy		0.990
Test Accuracy		0.894
Confusion Matrix	88	0
	19	72

Perceptron	4	6
Number of Epochs		6
Training Accuracy		0.990
Test Accuracy		0.863
Confusion Matrix	91	0
	24	60
Perceptron	4	8
Number of Epochs		5
Training Accuracy		0.979
Test Accuracy		0.791
Confusion Matrix	88	0
	36	48
Perceptron	5	6
Number of Epochs		6
Training Accuracy		1.000
Test Accuracy		0.989
Confusion Matrix	90	1
	1	87
Perceptron	5	8
Number of Epochs		5
Training Accuracy		0.990
Transition from the state of		0.500
Test Accuracy		
I .	88	0
Test Accuracy	88 88	0 0
Test Accuracy		v
Test Accuracy Confusion Matrix	88	0
Test Accuracy Confusion Matrix Perceptron	88	7
Test Accuracy Confusion Matrix Perceptron Number of Epochs	88	0 7 5
Test Accuracy Confusion Matrix Perceptron Number of Epochs Training Accuracy	88	0 7 5 1.000
Test Accuracy Confusion Matrix Perceptron Number of Epochs Training Accuracy Test Accuracy	6	7 5 1.000 1.000
Test Accuracy Confusion Matrix Perceptron Number of Epochs Training Accuracy Test Accuracy Confusion Matrix Perceptron	88 6 94	7 5 1.000 1.000 0
Test Accuracy Confusion Matrix Perceptron Number of Epochs Training Accuracy Test Accuracy Confusion Matrix Perceptron Number of Epochs	88 6 94 0	7 5 1.000 1.000 0 91
Test Accuracy Confusion Matrix Perceptron Number of Epochs Training Accuracy Test Accuracy Confusion Matrix Perceptron Number of Epochs Training Accuracy	88 6 94 0	0 7 5 1.000 1.000 0 91 9 5 1.000
Test Accuracy Confusion Matrix Perceptron Number of Epochs Training Accuracy Test Accuracy Confusion Matrix Perceptron Number of Epochs Training Accuracy Test Accuracy Test Accuracy	88 6 94 0 6	0 7 5 1.000 1.000 0 91 9
Test Accuracy Confusion Matrix Perceptron Number of Epochs Training Accuracy Test Accuracy Confusion Matrix Perceptron Number of Epochs Training Accuracy	88 6 94 0	0 7 5 1.000 1.000 0 91 9 5 1.000

Perceptron	7	8
Number of Epochs		5
Training Accuracy		1.000
Test Accuracy		0.984
Confusion Matrix	88	0
	3	91
Perceptron	8	9
Perceptron Number of Epochs	8	9 5
_	8	_
Number of Epochs	8	5
Number of Epochs Training Accuracy	103	5 0.990

Perceptron	7	9
Number of Epochs		5
Training Accuracy		0.990
Test Accuracy		0.884
Confusion Matrix	104	0
	23	71

Summary For learning rate 0.20 the total accuracy on the training data was 0.993, and the total accuracy on the test data was 0.841. The average number of epochs needed by each perceptron was 5.289.

Learning Rate 0.80: Data from the training and testing.

Percentron

Description

Perceptron	0	1
Number of Epochs		6
Training Accuracy		1.000
Test Accuracy		0.984
Confusion Matrix	91	0
	3	92
Perceptron	0	3
Number of Epochs		5
Training Accuracy		1.000
Test Accuracy		0.985
Confusion Matrix	105	0
	3	92
Perceptron	0	5
Number of Epochs		5
Training Accuracy		0.990
Test Accuracy		0.814
Confusion Matrix	88	0
	34	61

5.	
0	2
	5
	0.990
	0.571
94	0
81	14
0	4
	5
	0.990
	0.922
83	1
13	82
0	6
	6
	1.000
	0.946
81	10
0	95
	94 81 0 83 13

Perceptron	0	7
Number of Epochs		5
Training Accuracy		1.000
Test Accuracy		0.989
Confusion Matrix	94	0
	2	93
Perceptron	0	9
Number of Epochs		5
Training Accuracy		1.000
Test Accuracy		0.990
Confusion Matrix	104	0
	2	93
Perceptron	1	3
Number of Epochs		6
Training Accuracy		1.000
Test Accuracy		0.995
Confusion Matrix	105	0
	1	90
Perceptron	1	5
Number of Epochs		5
Training Accuracy		0.990
Test Accuracy		0.966
Confusion Matrix	88	0
	6	85
Perceptron	1	7
Number of Epochs		5
Training Accuracy		0.986
Test Accuracy		0.605
Confusion Matrix	94	0
	73	18
Perceptron	1	9
Number of Epochs		6
Training Accuracy		0.990
		0.733
Test Accuracy		
	104	0

Perceptron	0	8
Number of Epochs		5
Training Accuracy		0.989
Test Accuracy		0.967
Confusion Matrix	88	0
	6	89
Perceptron	1	2
Number of Epochs		5
Training Accuracy		0.990
Test Accuracy		0.984
Confusion Matrix	94	0
	3	88
Perceptron	1	4
Number of Epochs		5
Training Accuracy		0.986
Test Accuracy		0.480
Confusion Matrix	84	0
	91	0
Perceptron	1	6
Number of Epochs		5
Training Accuracy		0.991
Test Accuracy		0.984
Confusion Matrix	89	2
	1	90
Perceptron	1	8
Number of Epochs		5
Training Accuracy		0.980
Test Accuracy		0.564
Confusion Matrix	88	0
	78	13
Perceptron	2	3
Number of Epochs		5
Training Accuracy		0.990
Test Accuracy		0.819
Confusion Matrix	105	0
	36	58

Perceptron	2	4
Number of Epochs		5
Training Accuracy		1.000
Test Accuracy		0.972
Confusion Matrix	84	0
	5	89
Perceptron	2	6
Number of Epochs		6
Training Accuracy		1.000
Test Accuracy		0.978
Confusion Matrix	89	2
	2	92
Perceptron	2	8
Number of Epochs		5
Training Accuracy		0.984
Test Accuracy		0.956
Confusion Matrix	88	0
	8	86
Perceptron	3	4
Perceptron Number of Epochs	3	4 7
_	3	-
Number of Epochs	3	7
Number of Epochs Training Accuracy	83	7 1.000
Number of Epochs Training Accuracy Test Accuracy		7 1.000 0.995
Number of Epochs Training Accuracy Test Accuracy	83	7 1.000 0.995 1
Number of Epochs Training Accuracy Test Accuracy Confusion Matrix	83	7 1.000 0.995 1 105
Number of Epochs Training Accuracy Test Accuracy Confusion Matrix Perceptron	83	7 1.000 0.995 1 105
Number of Epochs Training Accuracy Test Accuracy Confusion Matrix Perceptron Number of Epochs	83	7 1.000 0.995 1 105 6 6
Number of Epochs Training Accuracy Test Accuracy Confusion Matrix Perceptron Number of Epochs Training Accuracy	83	7 1.000 0.995 1 105 6 6 1.000
Number of Epochs Training Accuracy Test Accuracy Confusion Matrix Perceptron Number of Epochs Training Accuracy Test Accuracy	83 0	7 1.000 0.995 1 105 6 6 1.000 0.985
Number of Epochs Training Accuracy Test Accuracy Confusion Matrix Perceptron Number of Epochs Training Accuracy Test Accuracy	83 0 3	7 1.000 0.995 1 105 6 6 1.000 0.985 3
Number of Epochs Training Accuracy Test Accuracy Confusion Matrix Perceptron Number of Epochs Training Accuracy Test Accuracy Confusion Matrix	83 0 3 88 0	7 1.000 0.995 1 105 6 6 1.000 0.985 3 105
Number of Epochs Training Accuracy Test Accuracy Confusion Matrix Perceptron Number of Epochs Training Accuracy Test Accuracy Confusion Matrix Perceptron	83 0 3 88 0	7 1.000 0.995 1 105 6 6 1.000 0.985 3 105
Number of Epochs Training Accuracy Test Accuracy Confusion Matrix Perceptron Number of Epochs Training Accuracy Test Accuracy Confusion Matrix Perceptron Number of Epochs	83 0 3 88 0	7 1.000 0.995 1 105 6 6 1.000 0.985 3 105
Number of Epochs Training Accuracy Test Accuracy Confusion Matrix Perceptron Number of Epochs Training Accuracy Test Accuracy Confusion Matrix Perceptron Number of Epochs Training Accuracy	83 0 3 88 0	7 1.000 0.995 1 105 6 6 1.000 0.985 3 105 8 5 0.989
Number of Epochs Training Accuracy Test Accuracy Confusion Matrix Perceptron Number of Epochs Training Accuracy Test Accuracy Confusion Matrix Perceptron Number of Epochs Training Accuracy Test Accuracy Test Accuracy Test Accuracy	83 0 3 88 0 3	7 1.000 0.995 1 105 6 6 1.000 0.985 3 105 8 5 0.989 0.891

Perceptron	2	5
Number of Epochs		5
Training Accuracy		0.990
Test Accuracy		0.797
Confusion Matrix	88	0
	37	57
Perceptron	2	7
Number of Epochs		5
Training Accuracy		1.000
Test Accuracy		0.984
Confusion Matrix	94	0
	3	91
Perceptron	2	9
Number of Epochs		5
Training Accuracy		0.985
Test Accuracy		0.566
Confusion Matrix	104	0
	86	8
Perceptron	3	5
Number of Epochs		5
Training Accuracy		0.984
Test Accuracy		0.544
Confusion Matrix	88	0
	88	17
Perceptron	3	7
Number of Epochs		5
Training Accuracy		0.990
Test Accuracy		1.000
Confusion Matrix	94	0
	0	105
Perceptron	3	9
Number of Epochs		5
Training Accuracy		0.990
Test Accuracy		0.498
Confusion Matrix	104	0
	105	0

Number of Epochs 5 Training Accuracy 0.990 Test Accuracy 0.895 Confusion Matrix 88 0 Perceptron 4 7 Number of Epochs 6 6 Training Accuracy 0.961 0.961 Confusion Matrix 94 0 Test Accuracy 0.990 5 Training Accuracy 0.990 0.553 Confusion Matrix 104 0 Perceptron 5 7 Number of Epochs 5 7 Training Accuracy 0.990 0.797 Confusion Matrix 94 0 Test Accuracy 0.797 0.797 Confusion Matrix 94 0 Training Accuracy 0.990 0.552 Confusion Matrix 104 0 Rest Accuracy 0.552 0.552 Confusion Matrix 104 0 Training Accuracy 0.990 0.888 Confusion Matrix </th <th>Perceptron</th> <th>4</th> <th>5</th>	Perceptron	4	5
Test Accuracy 0.895 Confusion Matrix 88 0 18 66 Perceptron 4 7 Number of Epochs 1.000 1.000 Test Accuracy 0.961 0.961 Confusion Matrix 94 0 To Training Accuracy 0.990 0.990 Test Accuracy 0.553 0.553 Confusion Matrix 104 0 Perceptron 5 7 Number of Epochs 5 5 Training Accuracy 0.990 0.797 Confusion Matrix 94 0 Test Accuracy 0.797 0.797 Confusion Matrix 94 0 Training Accuracy 0.990 0.990 Test Accuracy 0.552 Confusion Matrix 104 0 Number of Epochs 6 8 Training Accuracy 0.990 0.552 Confusion Matrix 104 0 Recuracy 0.9	Number of Epochs		5
Confusion Matrix 88 0 18 66 Perceptron 4 7 Number of Epochs 1.000 1.000 Test Accuracy 0.961 0.961 Confusion Matrix 94 0 Toff 7 77 Perceptron 4 9 Number of Epochs 5 5 Training Accuracy 0.990 0.553 Confusion Matrix 104 0 Perceptron 5 7 Number of Epochs 5 7 Training Accuracy 0.990 0.797 Confusion Matrix 94 0 Training Accuracy 0.990 0.990 Test Accuracy 0.552 Confusion Matrix 104 0 86 2 Perceptron 6 8 Number of Epochs 6 7 Training Accuracy 0.990 0.888 Confusion Matrix 88 0	Training Accuracy		0.990
Perceptron 4 7 Number of Epochs 6 Training Accuracy 1.000 Test Accuracy 0.961 Confusion Matrix 94 0 To 77 77 Perceptron 4 9 Number of Epochs 5 5 Training Accuracy 0.990 0.553 Confusion Matrix 104 0 Perceptron 5 7 Number of Epochs 5 5 Training Accuracy 0.990 0.797 Confusion Matrix 94 0 Test Accuracy 0.797 0.990 Test Accuracy 0.990 0.552 Confusion Matrix 104 0 Recuracy 0.552 0.552 Confusion Matrix 104 0 Recuracy 0.552 0.552 Training Accuracy 0.990 0.552 Test Accuracy 0.990 0.990 Test Accuracy 0.990 0.888	Test Accuracy		0.895
Perceptron 4 7 Number of Epochs 6 Training Accuracy 1.000 Test Accuracy 0.961 Confusion Matrix 94 0 To 77 77 Perceptron 4 9 Number of Epochs 5 5 Training Accuracy 0.990 0.553 Confusion Matrix 104 0 Perceptron 5 7 Number of Epochs 5 5 Training Accuracy 0.990 0.797 Confusion Matrix 94 0 Number of Epochs 5 5 Training Accuracy 0.990 0.552 Confusion Matrix 104 0 86 2 0.552 Perceptron 6 8 Number of Epochs 6 8 Training Accuracy 0.990 0.552 Test Accuracy 0.990 0.990 Test Accuracy 0.990 0.888	Confusion Matrix	88	0
Number of Epochs 6 Training Accuracy 1.000 Test Accuracy 0.961 Confusion Matrix 94 0 Confusion Matrix 94 0 Perceptron 4 9 Number of Epochs 5 5 Training Accuracy 0.990 0.553 Confusion Matrix 104 0 Perceptron 5 7 Number of Epochs 5 7 Training Accuracy 0.990 0.797 Confusion Matrix 94 0 Test Accuracy 0.990 5 Training Accuracy 0.990 0.552 Confusion Matrix 104 0 86 2 0.552 Perceptron 6 8 Number of Epochs 6 8 Training Accuracy 0.990 0.552 Test Accuracy 0.990 0.888 Confusion Matrix 88 0		18	66
Training Accuracy 1.000 Test Accuracy 0.961 Confusion Matrix 94 0 Perceptron 4 9 Number of Epochs 5 Training Accuracy 0.990 Test Accuracy 0.553 Confusion Matrix 104 0 84 0 Perceptron 5 7 Number of Epochs 5 5 Training Accuracy 0.990 0.797 Confusion Matrix 94 0 Test Accuracy 0.990 0.990 Test Accuracy 0.990 0.552 Confusion Matrix 104 0 86 2 0.552 Perceptron 6 8 Number of Epochs 6 6 Training Accuracy 0.990 0.990 Test Accuracy 0.990 0.888 Confusion Matrix 88 0	Perceptron	4	7
Test Accuracy 0.961 Confusion Matrix 94 0 7 77 Perceptron 4 9 Number of Epochs 5 Training Accuracy 0.990 Test Accuracy 0.553 Confusion Matrix 104 0 84 0 Perceptron 5 7 Number of Epochs 5 5 Training Accuracy 0.990 0.797 Confusion Matrix 94 0 Number of Epochs 5 5 Training Accuracy 0.990 0.552 Confusion Matrix 104 0 86 2 0.552 Perceptron 6 8 Number of Epochs 6 8 Training Accuracy 0.990 0.990 Test Accuracy 0.990 0.888 Confusion Matrix 88 0	Number of Epochs		6
Confusion Matrix 94 0 Perceptron 4 9 Number of Epochs 5 Training Accuracy 0.990 Test Accuracy 0.553 Confusion Matrix 104 0 S4 0 Perceptron 5 7 Number of Epochs 5 7 Training Accuracy 0.990 0.797 Confusion Matrix 94 0 Training Accuracy 0.990 5 Training Accuracy 0.990 0.552 Confusion Matrix 104 0 86 2 2 Perceptron 6 8 Number of Epochs 6 8 Training Accuracy 0.990 0.888 Test Accuracy 0.888 0 Confusion Matrix 88 0	Training Accuracy		1.000
Perceptron 4 9 Number of Epochs 5 Training Accuracy 0.990 Test Accuracy 0.553 Confusion Matrix 104 0 Receptron 5 7 Number of Epochs 5 7 Training Accuracy 0.990 0.797 Confusion Matrix 94 0 Test Accuracy 0.797 Confusion Matrix 94 0 Training Accuracy 0.990 Test Accuracy 0.552 Confusion Matrix 104 0 86 2 Perceptron 6 8 Number of Epochs 6 8 Number of Epochs 6 0.990 Test Accuracy 0.990 0.888 Confusion Matrix 88 0	Test Accuracy		0.961
Perceptron 4 9 Number of Epochs 5 Training Accuracy 0.990 Test Accuracy 0.553 Confusion Matrix 104 0 84 0 Perceptron 5 7 Number of Epochs 5 5 Training Accuracy 0.990 0.797 Confusion Matrix 94 0 Number of Epochs 5 5 Training Accuracy 0.990 0.552 Confusion Matrix 104 0 86 2 0.552 Perceptron 6 8 Number of Epochs 6 8 Training Accuracy 0.990 0.888 Test Accuracy 0.888 0 Confusion Matrix 88 0	Confusion Matrix	94	0
Number of Epochs 5 Training Accuracy 0.990 Test Accuracy 0.553 Confusion Matrix 104 0 84 0 Perceptron 5 7 Number of Epochs 5 5 Training Accuracy 0.990 0.797 Confusion Matrix 94 0 Test Accuracy 0.990 5 Training Accuracy 0.990 5 Test Accuracy 0.552 0.552 Confusion Matrix 104 0 86 2 0.990 Test Accuracy 0.990 0.888 Training Accuracy 0.990 0.888 Confusion Matrix 88 0		7	77
Training Accuracy 0.990 Test Accuracy 0.553 Confusion Matrix 104 0 84 0 Perceptron 5 7 Number of Epochs 5 5 Training Accuracy 0.990 0.797 Confusion Matrix 94 0 Tonfusion Matrix 94 0 Training Accuracy 0.990 Test Accuracy 0.552 Confusion Matrix 104 0 86 2 Perceptron 6 8 Number of Epochs 6 6 Training Accuracy 0.990 0.888 Test Accuracy 0.888 0	Perceptron	4	9
Test Accuracy 0.553 Confusion Matrix 104 0 84 0 Perceptron 5 7 Number of Epochs 5 7 Training Accuracy 0.990 0.797 Confusion Matrix 94 0 Tonfusion Matrix 94 0 Number of Epochs 5 5 Training Accuracy 0.990 0.552 Confusion Matrix 104 0 86 2 0.990 Perceptron 6 8 Number of Epochs 6 8 Training Accuracy 0.990 0.888 Confusion Matrix 88 0	Number of Epochs		5
Confusion Matrix 104 0 84 0 Perceptron 5 7 Number of Epochs 5 5 Training Accuracy 0.990 0.797 Confusion Matrix 94 0 37 51 9 Number of Epochs 5 9 Number of Epochs 5 9 Training Accuracy 0.990 0.552 Confusion Matrix 104 0 86 2 Perceptron 6 8 Number of Epochs 6 8 Training Accuracy 0.990 0.888 Test Accuracy 0.888 0	Training Accuracy		0.990
Perceptron 5 7 Number of Epochs 5 7 Training Accuracy 0.990 0.797 Test Accuracy 0.797 0.797 Confusion Matrix 94 0 37 51 0.51 Perceptron 5 9 Number of Epochs 5 5 Training Accuracy 0.990 0.552 Confusion Matrix 104 0 86 2 0.2 Perceptron 6 8 Number of Epochs 6 8 Training Accuracy 0.990 0.888 Test Accuracy 0.888 0	Test Accuracy		0.553
Perceptron 5 7 Number of Epochs 5 Training Accuracy 0.990 Test Accuracy 0.797 Confusion Matrix 94 0 37 51 Perceptron 5 9 Number of Epochs 5 Training Accuracy 0.990 Test Accuracy 0.552 Confusion Matrix 104 0 86 2 Perceptron 6 8 Number of Epochs 6 6 Training Accuracy 0.990 0.888 Test Accuracy 0.888 0	Confusion Matrix	104	0
Number of Epochs 5 Training Accuracy 0.990 Test Accuracy 0.797 Confusion Matrix 94 0 37 51 Perceptron 5 9 Number of Epochs 5 5 Training Accuracy 0.990 0.552 Confusion Matrix 104 0 86 2 Perceptron 6 8 Number of Epochs 6 6 Training Accuracy 0.990 0.888 Test Accuracy 0.888 0 Confusion Matrix 88 0		84	0
Training Accuracy 0.990 Test Accuracy 0.797 Confusion Matrix 94 0 37 51 Perceptron 5 9 Number of Epochs 5 Training Accuracy 0.990 Test Accuracy 0.552 Confusion Matrix 104 0 86 2 Perceptron 6 8 Number of Epochs 6 Training Accuracy 0.990 Test Accuracy 0.888 Confusion Matrix 88 0	Perceptron	5	7
Test Accuracy 0.797 Confusion Matrix 94 0 37 51 Perceptron 5 9 Number of Epochs 5 Training Accuracy 0.990 Test Accuracy 0.552 Confusion Matrix 104 0 86 2 Perceptron 6 8 Number of Epochs 6 Training Accuracy 0.990 Test Accuracy 0.888 Confusion Matrix 88 0 0	Number of Epochs		5
Confusion Matrix 94 0 37 51 Perceptron 5 9 Number of Epochs 5 Training Accuracy 0.990 Test Accuracy 0.552 Confusion Matrix 104 0 86 2 Perceptron 6 8 Number of Epochs 6 6 Training Accuracy 0.990 0.888 Confusion Matrix 88 0	Training Accuracy		0.990
Perceptron 5 9 Number of Epochs 5 5 Training Accuracy 0.990 0.552 Test Accuracy 0.552 0.552 Confusion Matrix 104 0 86 2 Perceptron 6 8 Number of Epochs 6 6 Training Accuracy 0.990 0.888 Confusion Matrix 88 0	Test Accuracy		0.797
Perceptron 5 9 Number of Epochs 5 Training Accuracy 0.990 Test Accuracy 0.552 Confusion Matrix 104 0 86 2 Perceptron 6 8 Number of Epochs 6 6 Training Accuracy 0.990 0.888 Confusion Matrix 88 0	Confusion Matrix	94	I
Number of Epochs 5 Training Accuracy 0.990 Test Accuracy 0.552 Confusion Matrix 104 0 86 2 Perceptron 6 8 Number of Epochs 6 7 Training Accuracy 0.990 0.888 Confusion Matrix 88 0		37	51
Training Accuracy 0.990 Test Accuracy 0.552 Confusion Matrix 104 0 86 2 Perceptron 6 8 Number of Epochs 6 6 Training Accuracy 0.990 0.888 Confusion Matrix 88 0	_	5	-
Test Accuracy 0.552 Confusion Matrix 104 0 86 2 Perceptron 6 8 Number of Epochs 6 6 Training Accuracy 0.990 0.888 Confusion Matrix 88 0			5
Confusion Matrix 104 0 86 2 Perceptron 6 8 Number of Epochs 6 6 Training Accuracy 0.990 0.888 Confusion Matrix 88 0			
Perceptron 6 8 Number of Epochs 6 8 Training Accuracy 0.990 0.888 Test Accuracy 0.888 0			0.552
Perceptron68Number of Epochs6Training Accuracy0.990Test Accuracy0.888Confusion Matrix880	Confusion Matrix		
Number of Epochs Training Accuracy Test Accuracy Confusion Matrix 6 0.990 0.888 0		86	2
Training Accuracy Test Accuracy Confusion Matrix 0.990 0.888 0	Perceptron	6	8
Test Accuracy 0.888 Confusion Matrix 88 0	Number of Epochs		6
Confusion Matrix 88 0	Training Accuracy		0.990
	Test Accuracy		0.888
20 71	Confusion Matrix	88	0
		20	71

Perceptron	4	6
Number of Epochs		7
Training Accuracy		1.000
Test Accuracy		0.989
Confusion Matrix	89	2
	0	84
Perceptron	4	8
Number of Epochs		5
Training Accuracy		0.979
Test Accuracy		0.686
Confusion Matrix	88	0
	54	30
Perceptron	5	6
Number of Epochs		5
Training Accuracy		1.000
Test Accuracy		0.994
Confusion Matrix	90	1
	0	88
Perceptron	5	8
Number of Epochs		5
Training Accuracy		0.990
Test Accuracy		0.500
Confusion Matrix	88	0
	88	0
Perceptron	6	7
Number of Epochs		5
Training Accuracy		1.000
Test Accuracy		1.000
Confusion Matrix	94	0
	0	91
Perceptron	6	9
Number of Epochs		5
Training Accuracy		1.000
Test Accuracy		1.000
1050 Hectaracy		
Confusion Matrix	104	0

Perceptron	7	8
Number of Epochs		5
Training Accuracy		1.000
Test Accuracy		0.973
Confusion Matrix	87	1
	4	90
Perceptron	8	9
Perceptron Number of Epochs	8	9 5
-	8	_
Number of Epochs	8	5
Number of Epochs Training Accuracy	8	5 0.990

Perceptron	7	9
Number of Epochs		5
Training Accuracy		0.990
Test Accuracy		0.667
Confusion Matrix	104	0
	66	28

Summary For learning rate 0.80 the total accuracy on the training data was 0.993, and the total accuracy on the test data was 0.836. The average number of epochs needed by each perceptron was 5.267.

Learning Rate 0.05:Data from the training and testing.Perceptron01Perceptron

Perceptron	0	1
Number of Epochs		6
Training Accuracy		1.000
Test Accuracy		0.978
Confusion Matrix	91	0
	4	91
Perceptron	0	3
Number of Epochs		6
Training Accuracy		1.000
Test Accuracy		0.995
Confusion Matrix	105	0
	1	94
Perceptron	0	5
Number of Epochs		5
Training Accuracy		0.990
Test Accuracy		0.847
Confusion Matrix	88	0
	28	67

ic draining and desting	o	
Perceptron	0	2
Number of Epochs		5
Training Accuracy		0.985
Test Accuracy		0.995
Confusion Matrix	94	0
	1	94
Perceptron	0	4
Number of Epochs		5
Training Accuracy		0.990
Test Accuracy		0.866
Confusion Matrix	84	0
	24	71
Perceptron	0	6
Number of Epochs		6
Training Accuracy		1.000
Test Accuracy		1.000
Confusion Matrix	91	0
	0	95

Perceptron	0	7
Number of Epochs		5
Training Accuracy		1.000
Test Accuracy		1.000
Confusion Matrix	94	0
	0	95
Perceptron	0	9
Number of Epochs		5
Training Accuracy		1.000
Test Accuracy		0.990
Confusion Matrix	104	0
	2	93
Perceptron	1	3
Number of Epochs		5
Training Accuracy		0.990
Test Accuracy		0.679
Confusion Matrix	105	0
	63	28
Perceptron	1	5
Number of Epochs		5
Training Accuracy		0.990
Test Accuracy		0.575
Confusion Matrix	88	0
	76	15
Perceptron	1	7
Number of Epochs		5
Training Accuracy		0.991
Test Accuracy		0.865
Confusion Matrix	94	0
	25	66
Perceptron	1	9
Number of Epochs		6
Training Accuracy		0.990
Test Accuracy		0.887
Confusion Matrix	104	0
	22	69

Perceptron	0	8
Number of Epochs		5
Training Accuracy		0.989
Test Accuracy		0.945
Confusion Matrix	88	0
	10	85
Perceptron	1	2
Number of Epochs		5
Training Accuracy		0.990
Test Accuracy		0.973
Confusion Matrix	94	0
	5	86
Perceptron	1	4
Number of Epochs		5
Training Accuracy		0.986
Test Accuracy		0.577
Confusion Matrix	84	0
	74	17
Perceptron	1	6
Number of Epochs		5
Training Accuracy		0.991
Test Accuracy		0.978
Confusion Matrix	89	2
	2	89
Perceptron	1	8
Number of Epochs		5
Training Accuracy		0.980
Test Accuracy		0.570
Confusion Matrix	88	0
	77	14
Perceptron	2	3
Number of Epochs		5
Training Accuracy		0.990
l <u> </u>	1	0.700
Test Accuracy		0.769
Test Accuracy Confusion Matrix	105 46	0.769

Perceptron	_	
	2	4
Number of Epochs		5
Training Accuracy		0.990
Test Accuracy		1.000
Confusion Matrix	84	0
	0	94
Perceptron	2	6
Number of Epochs		5
Training Accuracy		0.990
Test Accuracy		0.995
Confusion Matrix	91	0
	1	93
Perceptron	2	8
Number of Epochs		5
Training Accuracy		0.990
Test Accuracy		0.709
Confusion Matrix	88	0
	53	41
Perceptron	3	4
Number of Epochs		5
Training Accuracy		1.000
Test Accuracy		1.000
Confusion Matrix	84	0
	0	105
Perceptron	3	6
Number of Epochs		6
Training Accuracy		1.000
Test Accuracy		0.995
Confusion Matrix	90	1
	0	105
Perceptron	3	8
Number of Epochs		5
Training Accuracy		0.989
		0.974
Test Accuracy		
Test Accuracy Confusion Matrix	88	0

Perceptron	2	5
Number of Epochs		5
Training Accuracy		0.990
Test Accuracy		0.731
Confusion Matrix	88	0
	49	45
Perceptron	2	7
Number of Epochs		7
Training Accuracy		1.000
Test Accuracy		0.984
Confusion Matrix	92	2
	1	93
Perceptron	2	9
Number of Epochs		5
Training Accuracy		0.990
Test Accuracy		0.970
Confusion Matrix	104	0
	6	88
Perceptron	3	5
Number of Epochs		5
Training Accuracy		0.984
Test Accuracy		0.777
1 cot riccaracy		
Confusion Matrix	88	0
1	88 43	0 62
Confusion Matrix Perceptron		0
Confusion Matrix	43	62
Confusion Matrix Perceptron	43	62
Confusion Matrix Perceptron Number of Epochs	43	62 7 5
Confusion Matrix Perceptron Number of Epochs Training Accuracy	43	62 7 5 0.990
Confusion Matrix Perceptron Number of Epochs Training Accuracy Test Accuracy	3	62 7 5 0.990 0.472
Confusion Matrix Perceptron Number of Epochs Training Accuracy Test Accuracy	3 94	62 7 5 0.990 0.472 0
Confusion Matrix Perceptron Number of Epochs Training Accuracy Test Accuracy Confusion Matrix	3 94 105	62 7 5 0.990 0.472 0 0
Confusion Matrix Perceptron Number of Epochs Training Accuracy Test Accuracy Confusion Matrix Perceptron	3 94 105	62 7 5 0.990 0.472 0 0
Confusion Matrix Perceptron Number of Epochs Training Accuracy Test Accuracy Confusion Matrix Perceptron Number of Epochs	3 94 105	62 7 5 0.990 0.472 0 0 9 5
Confusion Matrix Perceptron Number of Epochs Training Accuracy Test Accuracy Confusion Matrix Perceptron Number of Epochs Training Accuracy	3 94 105	62 7 5 0.990 0.472 0 0 9 5 0.990

Perceptron	4	5
Number of Epochs		5
Training Accuracy		0.990
Test Accuracy		0.924
Confusion Matrix	88	0
	13	71
Perceptron	4	7
Number of Epochs		5
Training Accuracy		0.990
Test Accuracy		0.955
Confusion Matrix	94	0
	8	76
Perceptron	4	9
Number of Epochs		5
Training Accuracy		0.990
Test Accuracy		0.707
Confusion Matrix	104	C
	55	29
Perceptron	5	7
Number of Epochs		5
Training Accuracy		1.000
Test Accuracy		0.973
Confusion Matrix	94	0
	5	83
Perceptron	5	9
Number of Epochs		5
Training Accuracy		0.980
Test Accuracy		0.578
	104	C
Confusion Matrix	104	_
v	81	7
Confusion Matrix		
Confusion Matrix Perceptron	81	7
Confusion Matrix Perceptron Number of Epochs	81	8 5
Confusion Matrix Perceptron Number of Epochs Training Accuracy	81	8
Confusion Matrix Perceptron Number of Epochs	81	8 5 0.990

Perceptron	4	6
Number of Epochs		6
Training Accuracy		0.990
Test Accuracy		0.983
Confusion Matrix	91	0
	3	81
Perceptron	4	8
Number of Epochs		5
Training Accuracy		0.990
Test Accuracy		0.878
Confusion Matrix	88	0
	21	63
Perceptron	5	6
Number of Epochs		5
Training Accuracy		1.000
Test Accuracy		0.989
Confusion Matrix	90	1
	1	87
Perceptron	5	8
Number of Epochs		7
Training Accuracy		0.990
Test Accuracy		0.938
Confusion Matrix	88	0
	11	77
Perceptron	6	7
Number of Epochs		5
Training Accuracy		1.000
Test Accuracy		0.984
Confusion Matrix	94	0
	3	88
Perceptron	6	9
Number of Epochs		5
Training Accuracy		1.000
Test Accuracy		1.000
Confusion Matrix	104	0
	0	91

Perceptron	7	8
Number of Epochs		6
Training Accuracy		1.000
Test Accuracy		0.978
Confusion Matrix	88	0
	4	90
Perceptron	8	9
Perceptron Number of Epochs	8	9 5
_	8	_
Number of Epochs	8	5
Number of Epochs Training Accuracy	8	5 0.990

Perceptron	7	9
Number of Epochs		5
Training Accuracy		0.990
Test Accuracy		0.960
Confusion Matrix	104	0
	8	86

Summary For learning rate 0.05 the total accuracy on the training data was 0.992, and the total accuracy on the test data was 0.859. The average number of epochs needed by each perceptron was 5.244.