Question 5: The trained network average 90% accuracy for PenTets and 86% accuracy for CarTest.

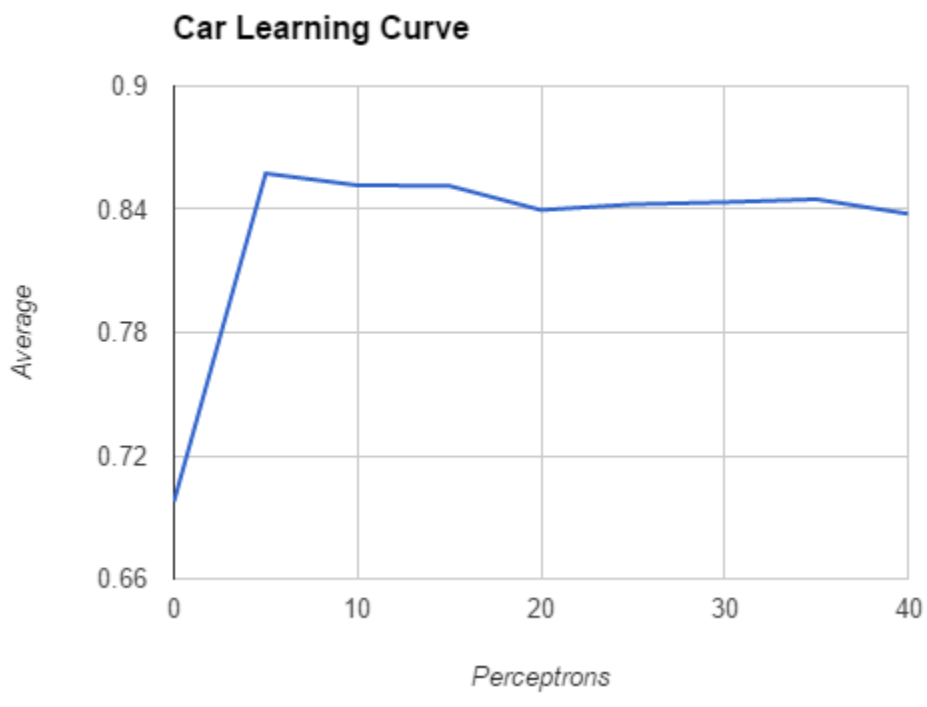
PenTest
Max: 0.906232132647
Average: 0.900171526587
Standard Deviation: 0.0056409969054

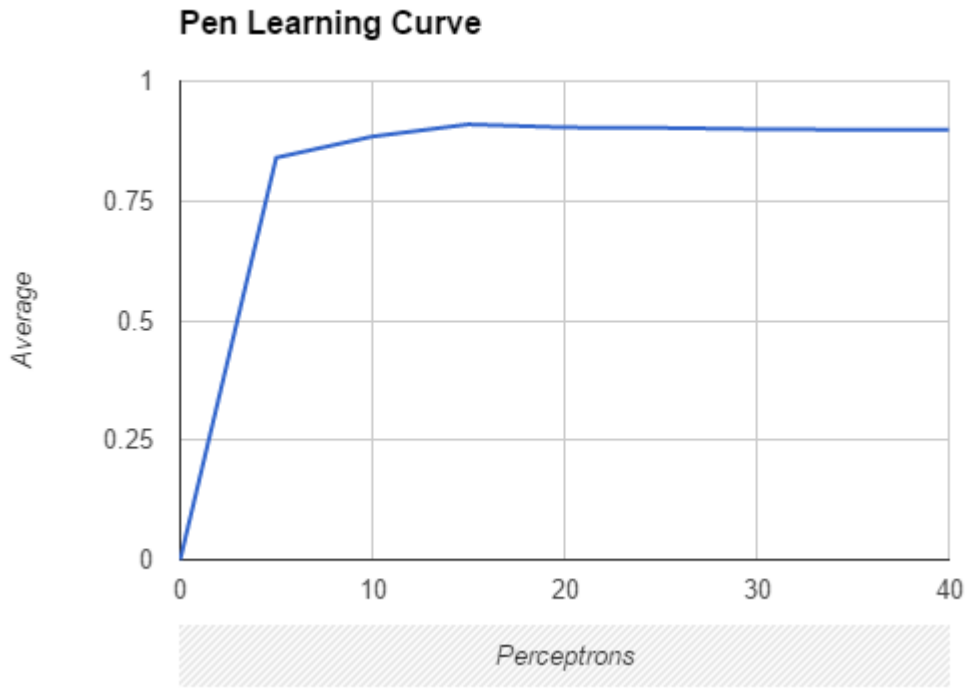
CarTest
Max: 0.885471204188
Average: 0.862041884817
Standard Deviation: 0.0180343504185

Question 6: Increasing the size of the hidden layer gives diminishing marginal returns that are evident at even five perceptrons. The average accuracy is 70% for CarTest and 0% for PenTest with 0 perceptrons, but by five perceptrons this number rapidly rises to about 85% for CarTest and 90% for PenTest. The average accuracy does not increase much from here for PenTest. For CarTest, the accuracy decreases after 5 perceptrons, most likely due to noise from having a large amount of layers. More iterations would fix this problem.

Pen Test									
Max	0	0.849342	0.89251	0.941395	0.909663	0.907376	0.907376	0.909377	0.904231
Average	0	0.840137	0.884277	0.90972	0.903373	0.902401	0.899714	0.898628	0.898342
StdDev	0	0.008036	0.006615	0.015904	0.009369	0.007408	0.006637	0.008271	0.006128
Perceptrons	0	5	10	15	20	25	30	35	40

Car Test									
Max	0.697644	0.867801	0.867147	0.856021	0.862565	0.853403	0.852094	0.853403	0.846204
Average	0.697644	0.857461	0.851702	0.85144	0.83966	0.842408	0.843455	0.844895	0.837827
StdDev	0	0.009728	0.010152	0.003702	0.011838	0.006537	0.005482	0.006801	0.008745
Perceptrons	0	5	10	15	20	25	30	35	40





XorTest	No Hidden Layer: 0.5 accuracy														
Max	0.75	0.75	0.75	0.75	1	0.75	0.75	1	1	0.75	1	0.75	1	1	1
Average	0.55	0.55	0.6	0.6	0.7	0.6	0.65	0.65	0.75	0.6	0.85	0.65	0.85	0.95	0.9
StdDev	0.1	0.1	0.1224744871	0.1224744871	0.1870828693	0.1224744871	0.1224744871	0.2	0.158113883	0.1224744871	0.2	0.1224744871	0.2	0.1	0.1224744871

Perceptrons	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Max	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Average	0.85	0.8	0.95	1	0.95	0.95	1	0.95	1	0.9	0.95	1	1	1	1
StdDev	0.2	0.1870828693	0.1	0	0.1	0.1	0	0.1	0	0.1224744871	0.1	0	0	0	0
Perceptrons	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30

Question 7: I trained the neural network using 1,000 iterations. The Xor Test had 50% accuracy with no hidden layer. Training the neural network with more perceptrons yielded a mostly increasing average accuracy. Getting a neural network with no error was achieved steadily using at least 27 perceptrons. Here, the average remained 100% accuracy and the standard deviation was 0, meaning each of the five tests yielded 100% accuracy. With 10,000 iterations the no hidden layer accuracy was also 50%. With 1 perceptron, the average accuracy was 65%, with 2 it was 90%, and with 3 it was 100% accurate. With each subsequent increase in perceptrons the average accuracy remained 100% and the standard deviation remained 0. As expected, more iterations allow the neural network to train with more accuracy using less perceptrons.