Question5:

| Pen Results:

| MAX:0.907947398513

| Average:0.902858776444

| Std Dev:0.00404049393803

| Car Results:

| MAX:0.85667539267

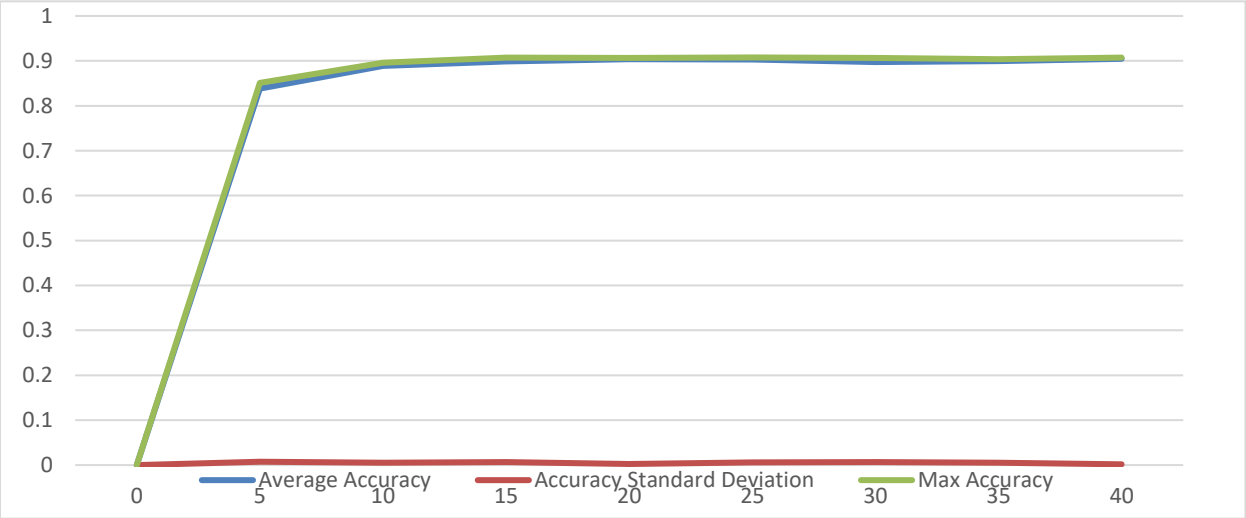
| Average:0.844109947644

| Std Dev:0.00762539877677

Question6:

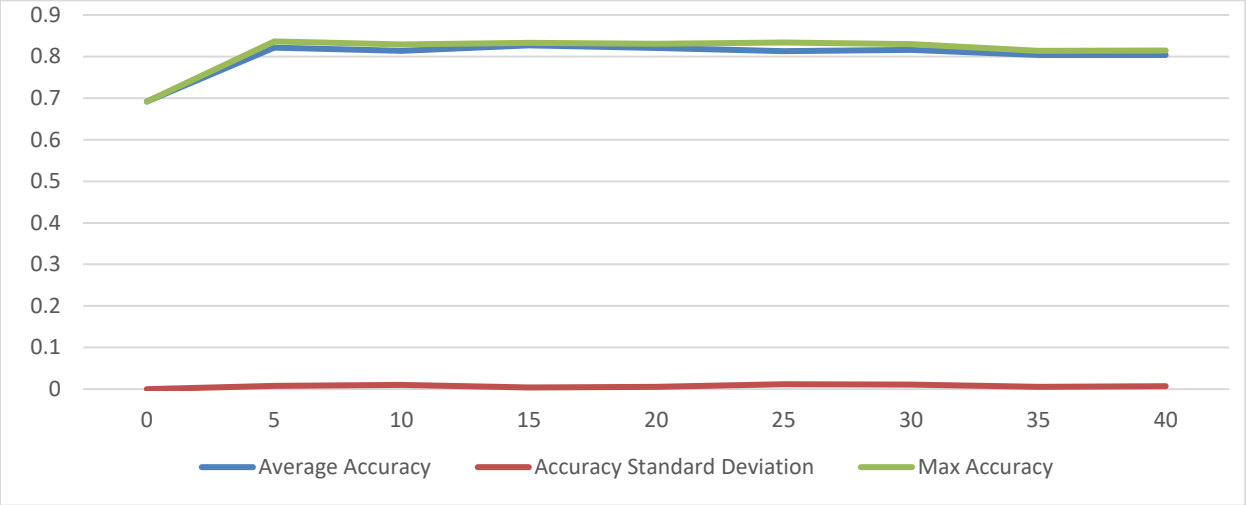
Pen Data:

# of Neurons	Average Accuracy	Accuracy Standard Deviation	Max Accuracy
0	0	0	0
5	0.838136078	0.007495012	0.85077187
10	0.888507719	0.005522694	0.895940537
15	0.898913665	0.006565484	0.907089766
20	0.903773585	0.002648653	0.90651801
25	0.903144654	0.006046566	0.907661521
30	0.897198399	0.006909965	0.90651801
35	0.89948542	0.005344001	0.903659234
40	0.904574042	0.001975661	0.907089766



Car Data:

# of Neurons	Average Accuracy	Accuracy Standard Deviation	Max Accuracy
0	0.691753927	0	0.691753927
5	0.821465969	0.007602898	0.836387435
10	0.813874346	0.010377526	0.829188482
15	0.826963351	0.00437259	0.833115183
20	0.820680628	0.005675257	0.830497382
25	0.812696335	0.011826552	0.833769634
30	0.815706806	0.011187846	0.829842932
35	0.804057592	0.005714366	0.813481675
40	0.803664921	0.007181082	0.814136126



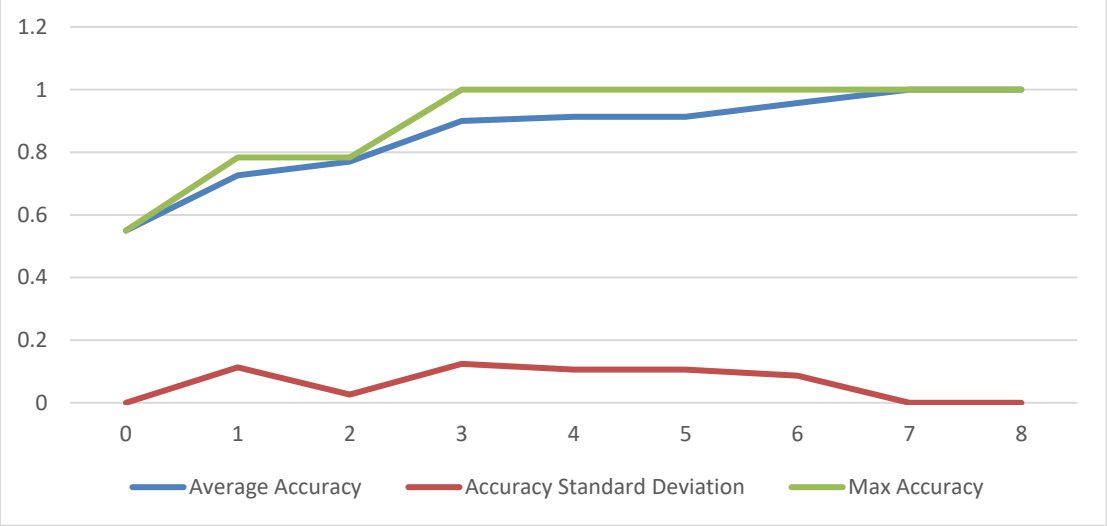
Analysis:

With the increment of the number of hidden layer perceptron, the neural network's accuracy increases. With the increment of the dimension of the matrices, the space of the neural network grows. The size of data set decided the time-consuming for each step.

Notice, after there are more than five perceptron, the accuracy of the neural network nearly stays the same. The reasons could be many. But at least one reason for sure. For those very straight-forwarding questions set like , they need a few hidden layer perceptron to reach to maximum accuracy. Think of the process of figuring out the result of 1 + 1. However, complicated questions like figure out the relativity theory will require more perceptron. Think of questions like how to decide danger.

Question 7:

# of Neurons	Average Accuracy	Accuracy Standard Deviation	Max Accuracy
0	0.55	0	0.55
1	0.726666667	0.113333333	0.783333333
2	0.77	0.026666667	0.783333333
3	0.9	0.124275679	1
4	0.913333333	0.106141446	1
5	0.913333333	0.106141446	1
6	0.956666667	0.086666667	1
7	1	0	1
8	1	0	1
9	1	0	1
10	1	0	1



Analysis:

Based on the data we've got, it shows the result of non-linear approximation training. Towards to question like XOR, we don't have any linear function to choose. I mean we have to approach this problem by doing some classification and non-linear approximation. By adding the hidden layer, we could actually do the classification. We will use the hidden layer's perceptron to store the information by run the back propagation and train the neural net. With the increment of the number of the perceptron in the hidden layer, we could do better on classification so that the accuracy will be higher. The reason that the accuracy eventually goes to 100% is because the data set of XOR question is quite limited and totally predictable so that we can do the perfect classification with enough perceptron.