Question 5)

Car Data:

Max Accuracy = .985

Average Accuracy = .975

Standard Deviation = 0.007905694150420955

Pen Data:
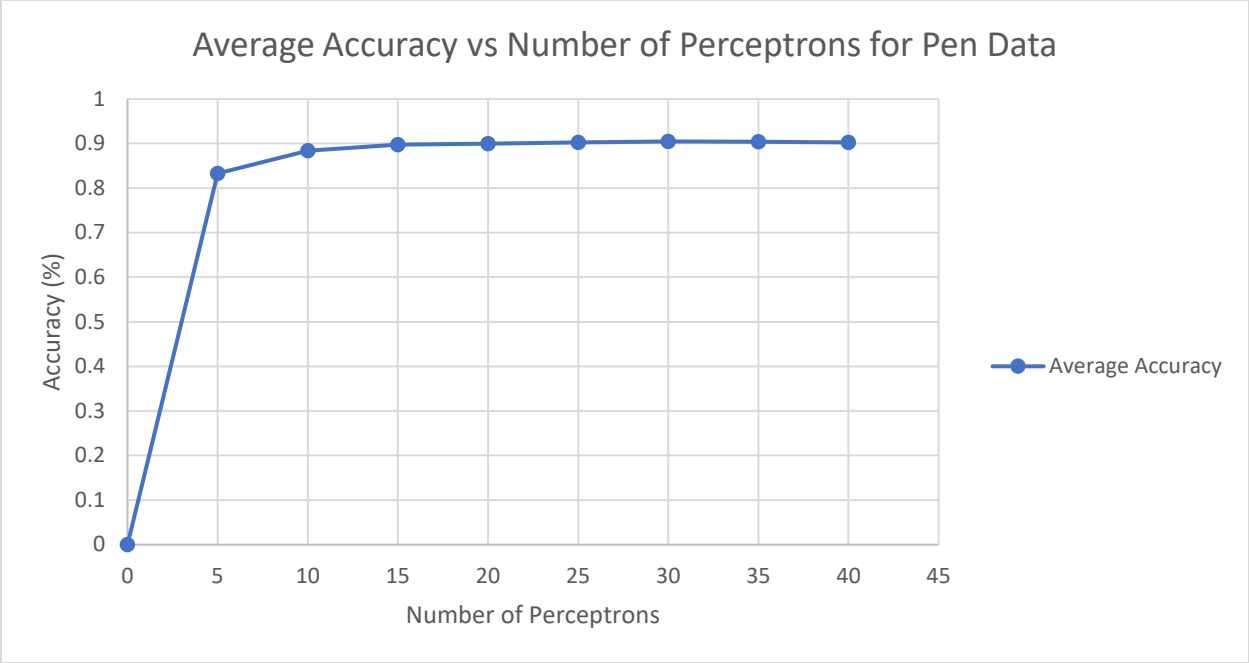
Max Accuracy = 0.907662

Average Accuracy = 0.9040024

Standard Deviation = 0.004198681793134571

Question 6)

Pen Data

Number of Perceptrons	Max Accuracy	Average Accuracy	Standard Deviation
0	0	0	0
5	0.8459119496855346	0.8329331046312178	0.009631319240363902
10	0.8962264150943396	0.8838765008576329	0.008563741476821606
15	0.9048027444253859	0.8974842767295599	0.008548841025301597
20	0.906232132647227	0.8992567181246425	0.007062045812072973
25	0.907661520869068	0.9026300743281876	0.0048602562692632014
30	0.906232132647227	0.9045168667810177	0.0018526988846220107
35	0.906232132647227	0.9040022870211549	0.003369962728025452
40	0.9082332761578045	0.9021726700971984	0.007148999131932111

Average Accuracy vs Number of Perceptrons for Pen Data

Accuracy (%) vs Number of Perceptrons

— Average Accuracy

Car Data

Number of Perceptrons	Max Accuracy	Average Accuracy	Standard Deviation
0	0.645	0.645	0
5	0.96	0.9570000000000001	0.0040000000000000036
10	0.98	0.9720000000000001	0.00509901951359279
15	0.955	0.952	0.0040000000000000036
20	0.97	0.96	0.00836660026534076
25	0.965	0.959	0.0037416573867739447
30	0.965	0.961	0.0037416573867739447
35	0.96	0.953	0.0040000000000000036
40	0.965	0.954	0.0040000000000000036

Average Accuracy vs Number of Perceptrons for Car Data
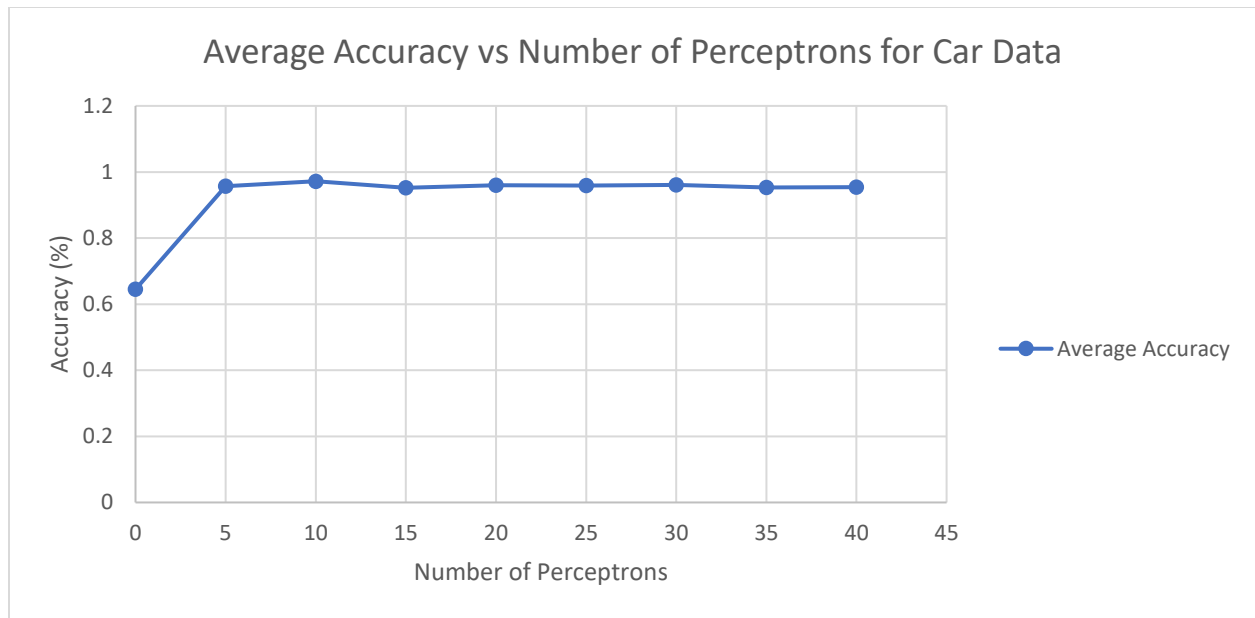
Generally, increasing the size of the hidden layer helps at lower numbers of perceptrons, but then plateaus as we add more. For the pen data, we plateau around 15 perceptrons. For the car data, we plateau around 5 perceptrons. Adding more layers at this point is not necessary and only increases complexity and training time while not making our accuracy any better.