Homework 4
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Part1

i)

I expect Model 1 would yield a higher optimal price. Because in model 2 more variables are omitted, product with feature should have higher price and lower sales, stores with higher price should have lower sales,and price is negatively correlated with sales,thus in model 2, downward bias was made due to omitted variables.

j)

Model	Optimal Price	Optimal Profit
Model 1	1.05	2.083353
Model 2	0.57	3.185952

I think model 2 will result in higher profits, model 1's expected profit is smaller as show the table, and model 2 ommited several variables that lead to downward bias, thus the number in model are underestimated. So the real number of optimal profit in model 2 could be larger then 3.186.

Part2

b)

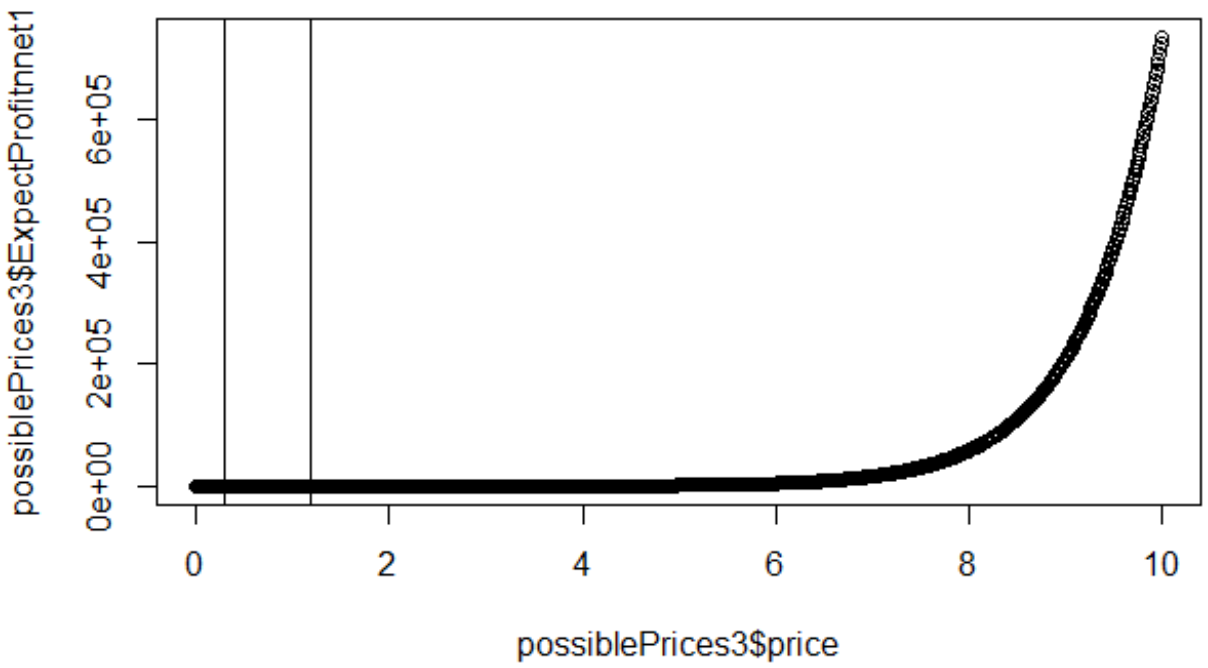
Price	Demand(nnet1)	Demand(nnet2)
0.50	7.607205	11.9097
1.00	2.439964	2.036778

Nnet1 predicts the demand to drop by 5.17, and nnet 2 predicts the demand to drop by 9.87. Nnet2 predict a larger reaction because the omitted variable would lead to a downward bias. Since sales is negatively correlated with price, nnet2's prediction tend to drop more as price increases the same.

c)

Model	Optimal Price	Optimal Profit
Nnet 1	10	735753
Nnet 2	0.71	4.523674

d)



Nnet1 model has the problem of Practical Issues: Out of Sample Predictions. The observed data range is [0.29,1.19], only between the lines does we observe data as shown on the plot. Price with range of [0,10] is far exceeding the data range, so it's extrapolation and hard to predict the demand with an exceeding price.

I change the price range to [0.29,1.19] and repeat the prediction using nnet1. The reasonable optimal price is 0.67 and optimal profit is 3.430114.