

A1

Q1

Model	Train RMSE	Test RMSE	Num Parameters
1	1.44834	1.424781	4
2	1.159677	1.11978	7
3	0.5070891	0.5269903	13
4	0.5044712	0.5332113	18

Model 3 is best at making predictions because it has the smallest Test RMSE.

Q2

Model	Desc	Train RMSE	Test RMSE	Num Parameters
<code>medv ~ .^2</code>	Baseline	2.641685	2.813286	91
<code>medv ~ .</code>	Smaller	4.675465	4.767746	13
<code>medv ~ .^2 + I(black^2)</code>	Larger	2.636336	2.837968	92

Q3

k	Train RMSE	Test RMSE	Fit
5	1.645974	2.156945	Over
10	1.703955	2.08401	Over
15	1.790904	2.047302	Under
20	1.930387	2.055042	Under
25	2.023999	2.14426	Under
30	2.284619	2.360523	Under
35	2.601655	2.672844	Under
40	2.957898	2.994395	Under
45	3.270317	3.287538	Under
50	3.581351	3.566584	Under

Q4

k	Scaled	Test MSE
1	No	0.4678402
1	Yes	0.520477
5	No	0.2882769
5	Yes	0.298908
25	No	0.2660158
25	Yes	0.258192

## Q5

A KNN model that outperforms the given linear model can be constructed as follows:

```
model = FNN::knn.reg(  
  train = scale(auto_trn[, -1]),  
  test = scale(auto_trn[, -1]),  
  y = auto_tst$y,  
  k = 6  
)
```

This model uses scaled X data and a k value of 6. It has a test RSME of 3.04648 beating the linear model, which had a test RSME of 3.495659.