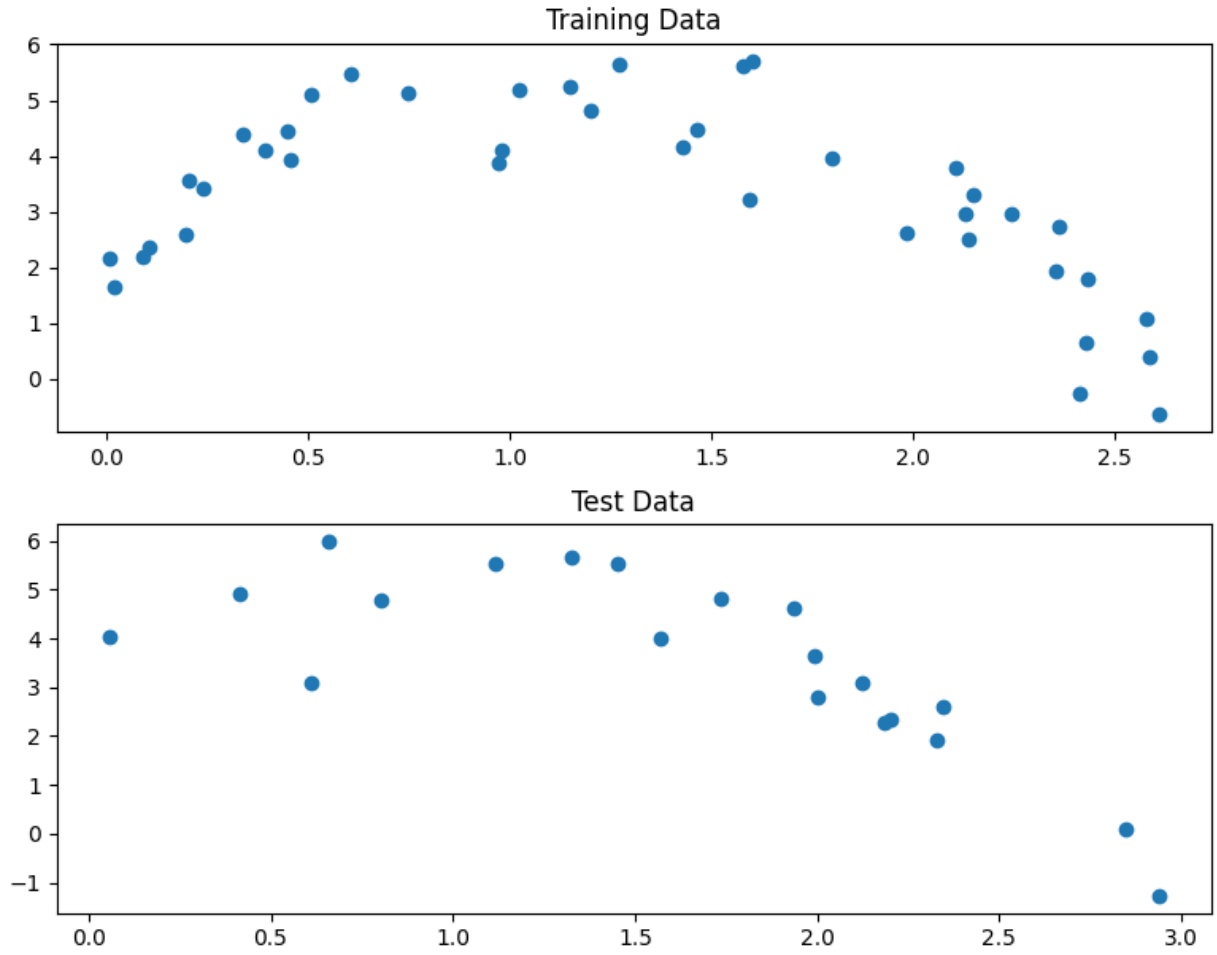
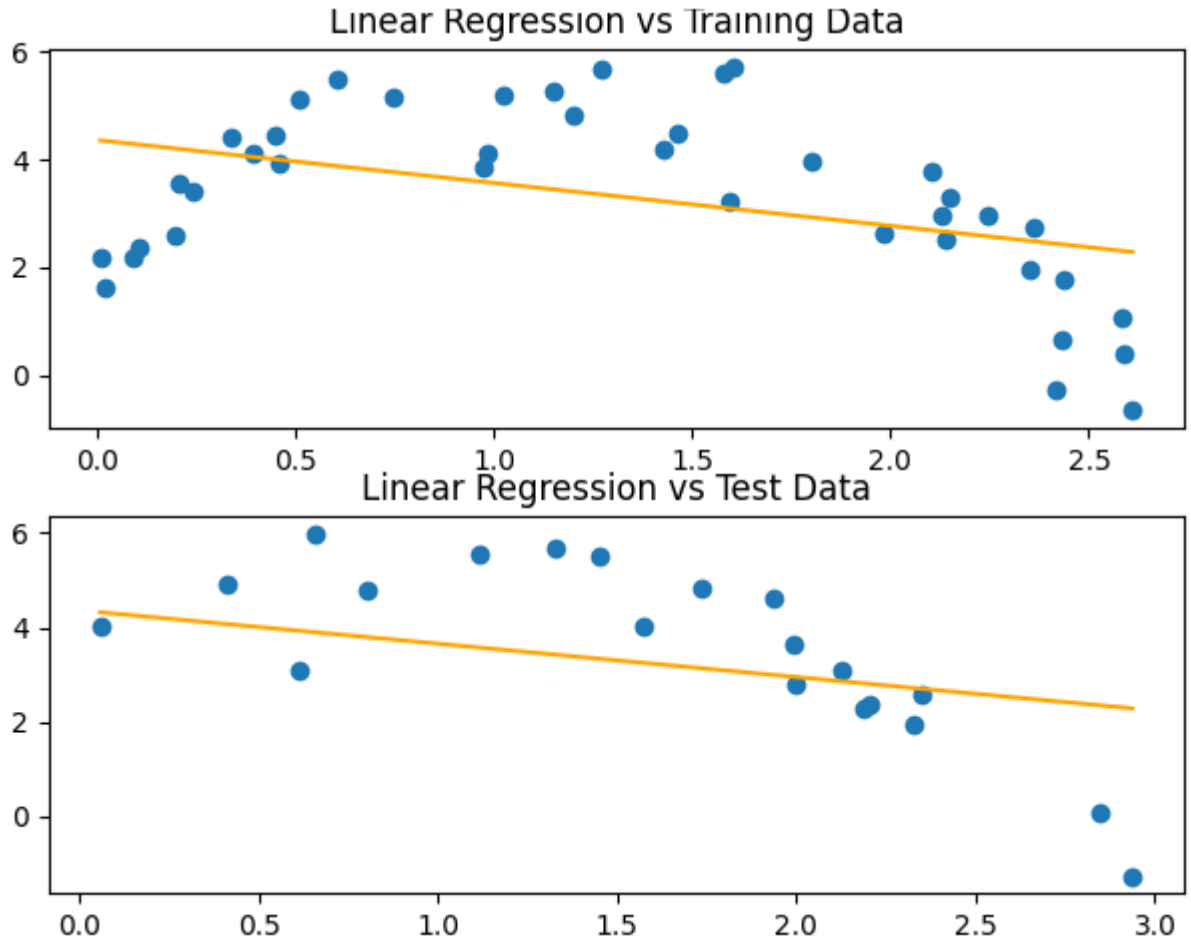

Training Data
6
5
4
3
2
1
0
0.0
0.5
1.0
1.5
2.0
2.5
Test Data
6
5
4
3
2
1
0
−1
0.0
0.5
1.0
1.5
2.0
2.5
3.0




Regression Model: Linear

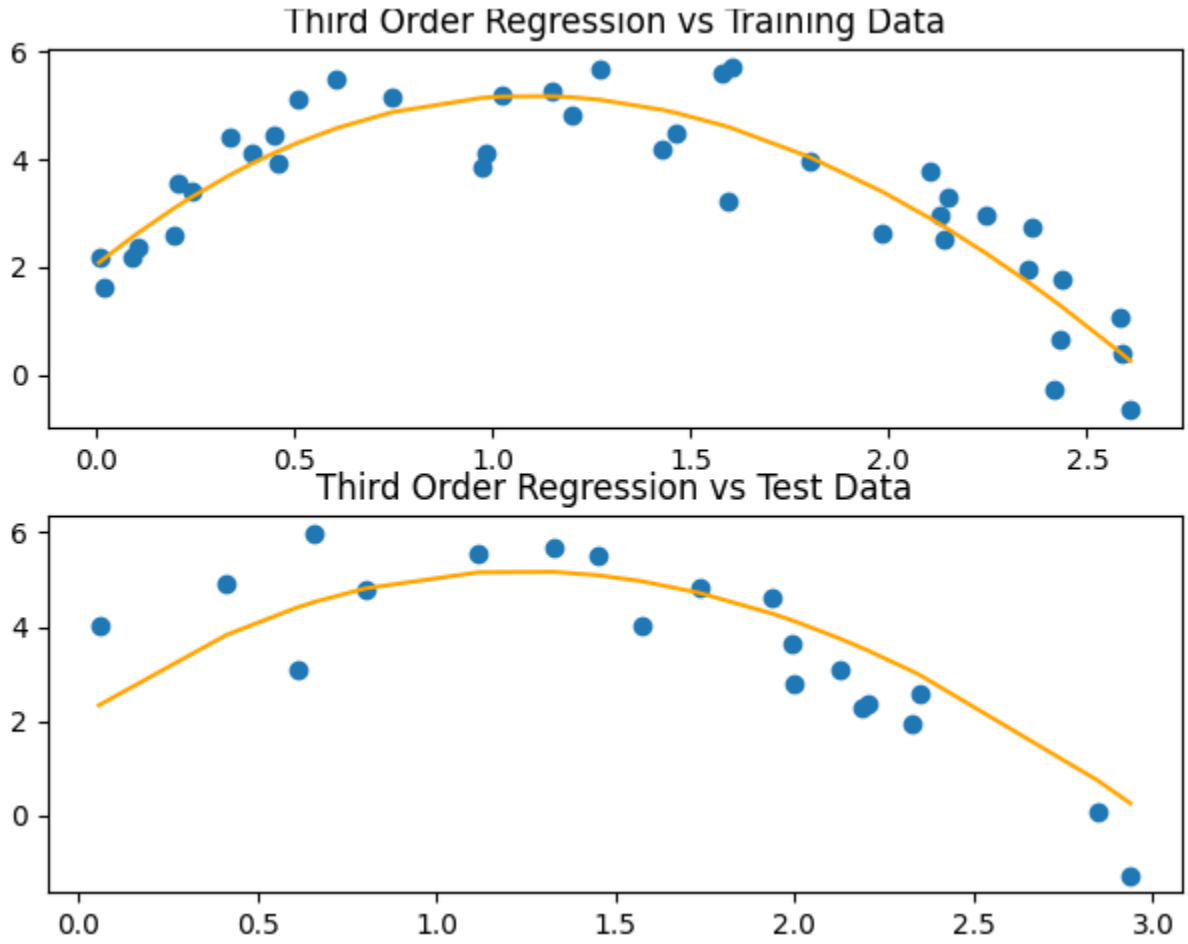
Average error of Training: 2.1739455790492586

Average error of Testing: 2.302756736392334


Regression Model:  Second Order

Average error of Training:  0.4846845031271547

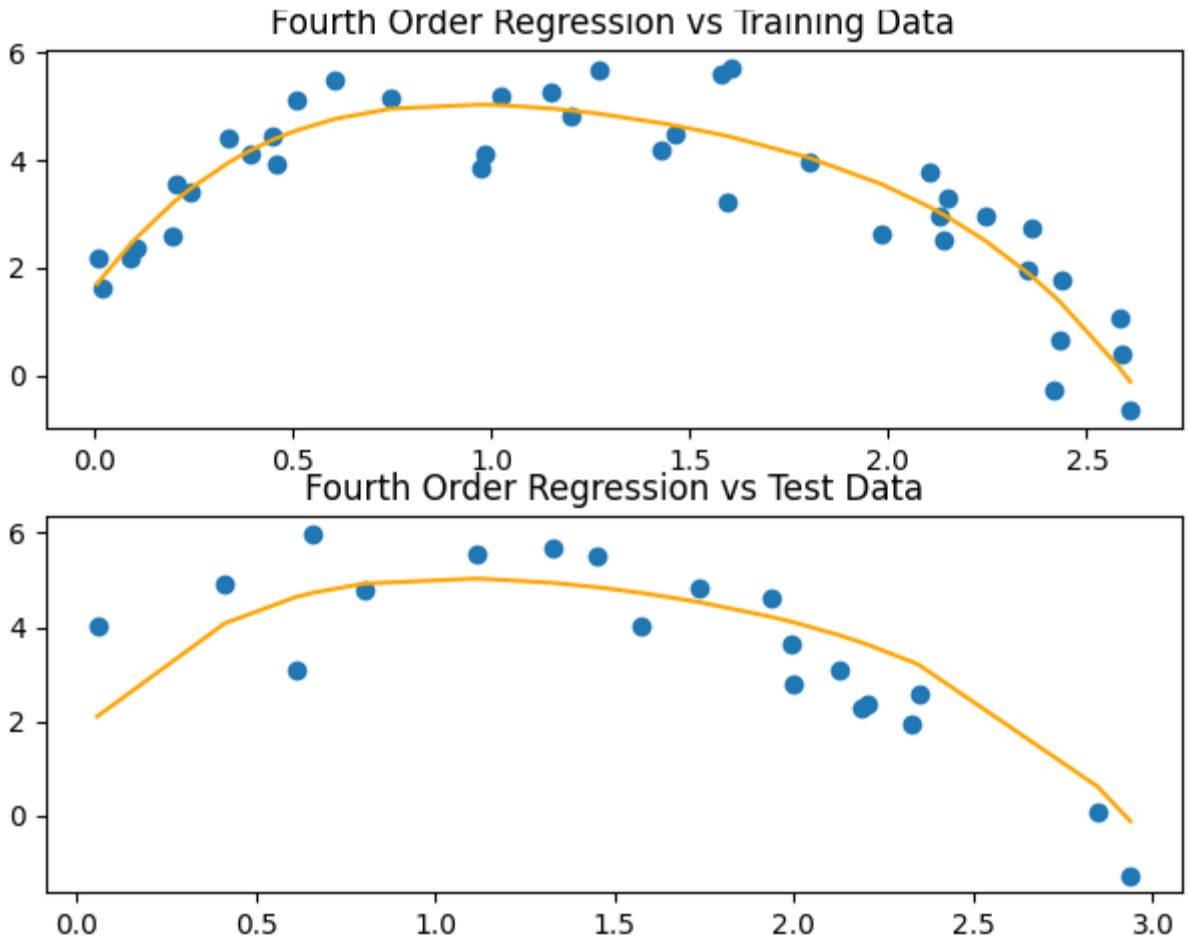
Average error of Testing:  0.9845329677979023




Regression Model:  Third Order

Average error of Training:  0.48055213344532577

Average error of Testing:  0.9548074062620554




Regression Model: Fourth Order

Average error of Training: 0.4366476340997161

Average error of Testing: 1.0104837751682925

For Training error:

Second Order is better than Linear

Third Order is better than Second Order

Fourth Order is better than Third Order

best Training error is Fourth Order

For Testing error:

Second Order is better than Linear

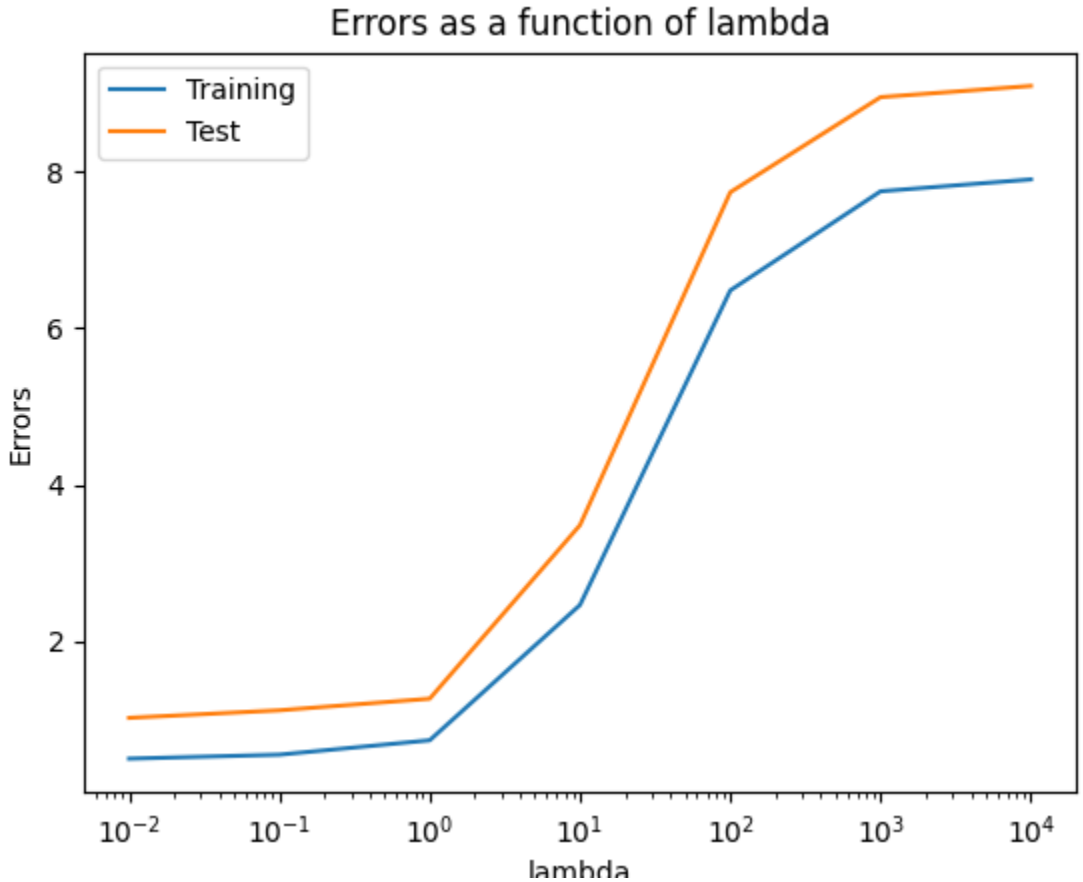
Third Order is better than Second Order

Third Order is better than Fourth Order

best Testing error is Third Order

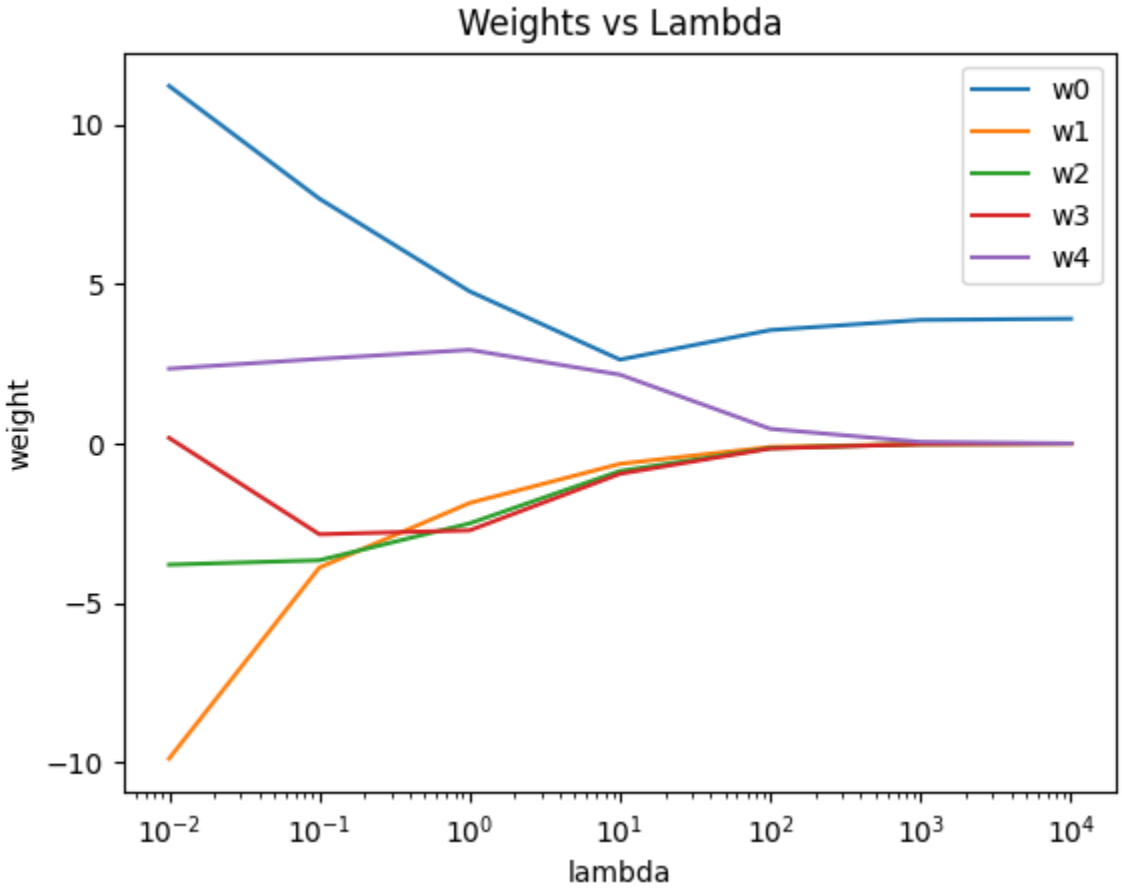
2D:

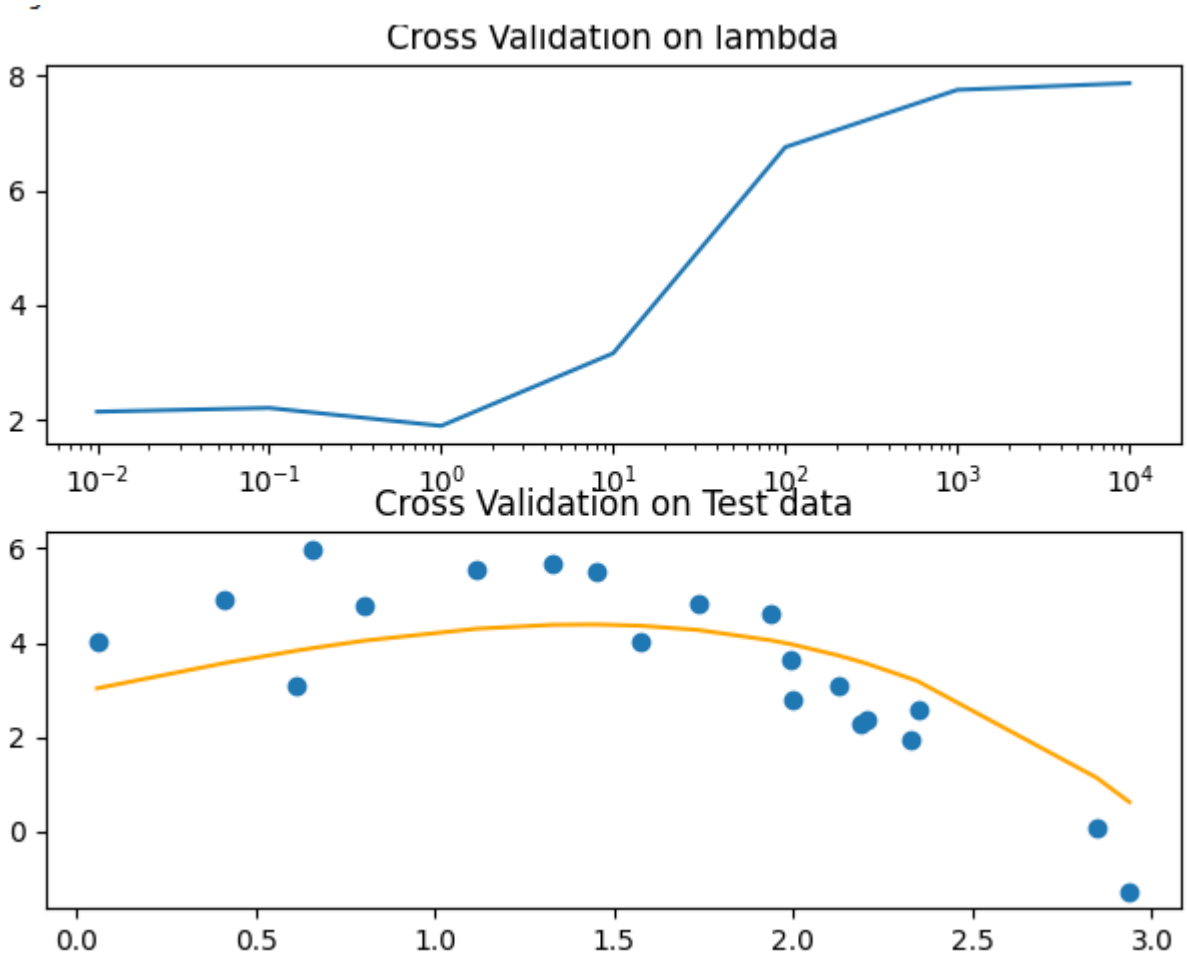
Hard to tell which order is the best since training and test errors do not correlate




3A

training and test error correlate, Best lambda is  0.01


Weights vs Lambda
w0
w1
w2
w3
w4
10
5
0
−5
−10
weight
$10^{-2}$
$10^{-1}$
$10^{0}$
$10^{1}$
$10^{2}$
$10^{3}$
$10^{4}$
lambda




4C

Best lambda is 1