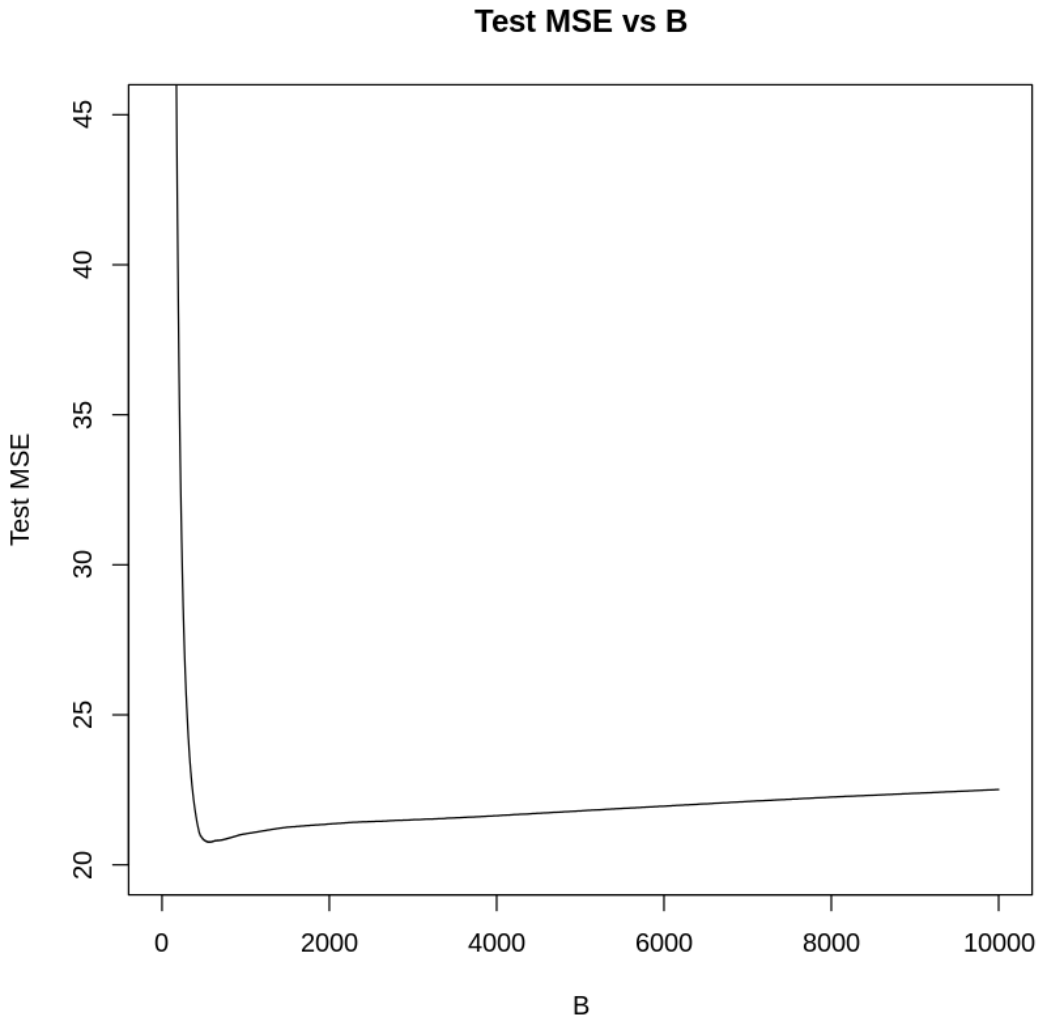
REPORT

Answer 1: Decision Stump MSE Test error = 52.57693.

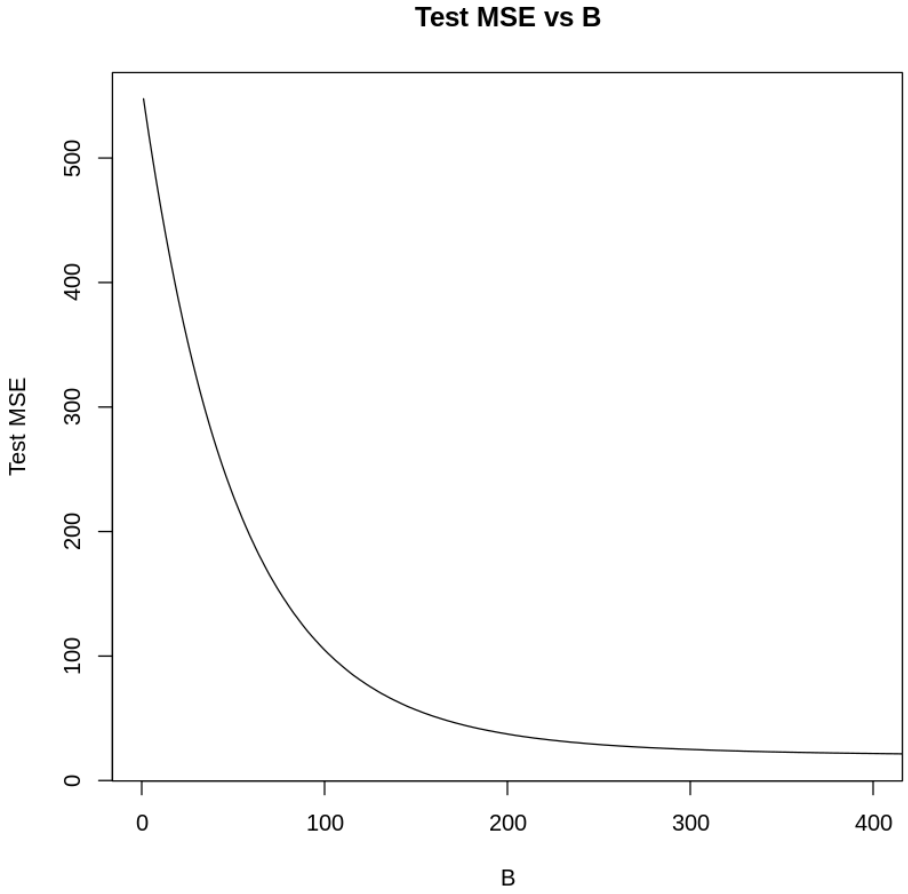
Answer 2: Boosted Decision Stump MSE Test error = 21.03624.

Answer 3: There is some overfitting as expected since after a certain point the MSE test error begins to increase. However, the overfitting tends to occur very slowly due to the presence of learning parameter, eta.



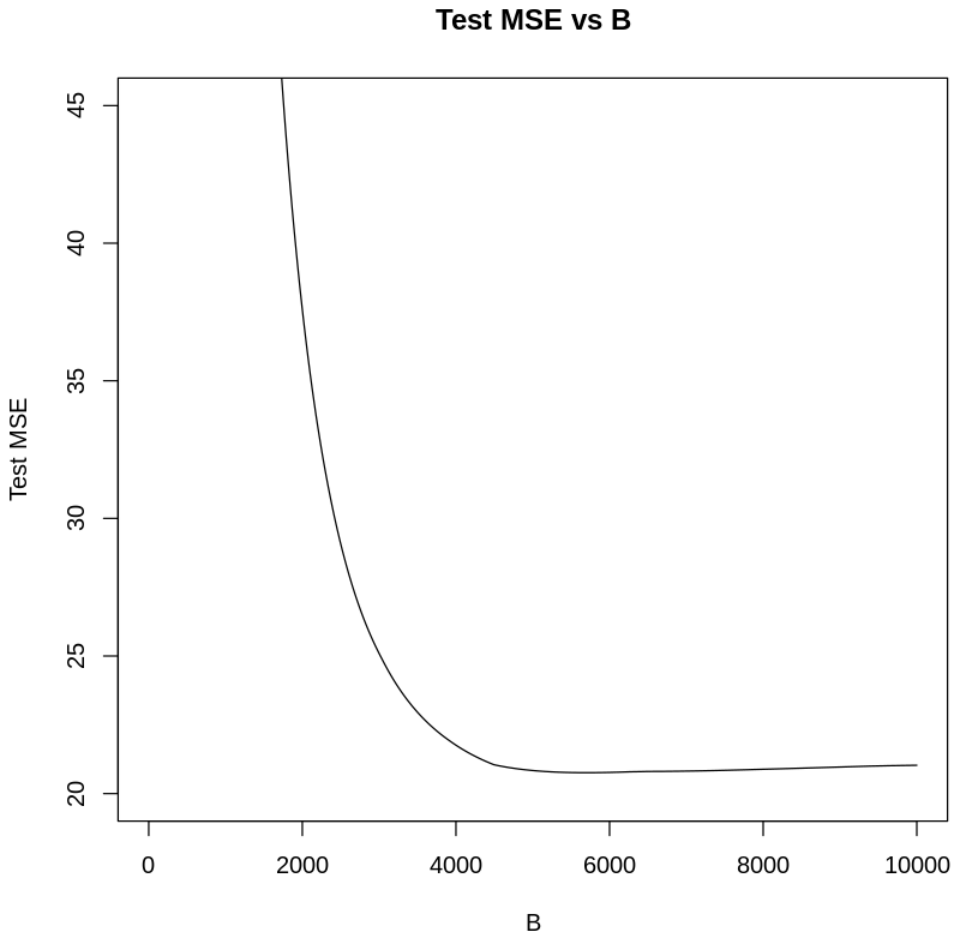
Observations: In BDS for very small Values of B the Test MSE tends to be very high due to the presence of learning parameter which penalizes our predictions for small values of B. The best value of B for least test error was around 500. The plot I have added for answer 3 doesn't some

effects properly. Below is another graph for Values of B till 400. Here, we can see the effect of value B for our test error formula. Using our Test MSE formula for B = 1 gives us a very high error. This is due to the presence of learning parameter, eta which is not useful for B= 1. B = 1 is equivalent to using a single stump, which gives us the true error value which was calculated in part 1 of the assignment.

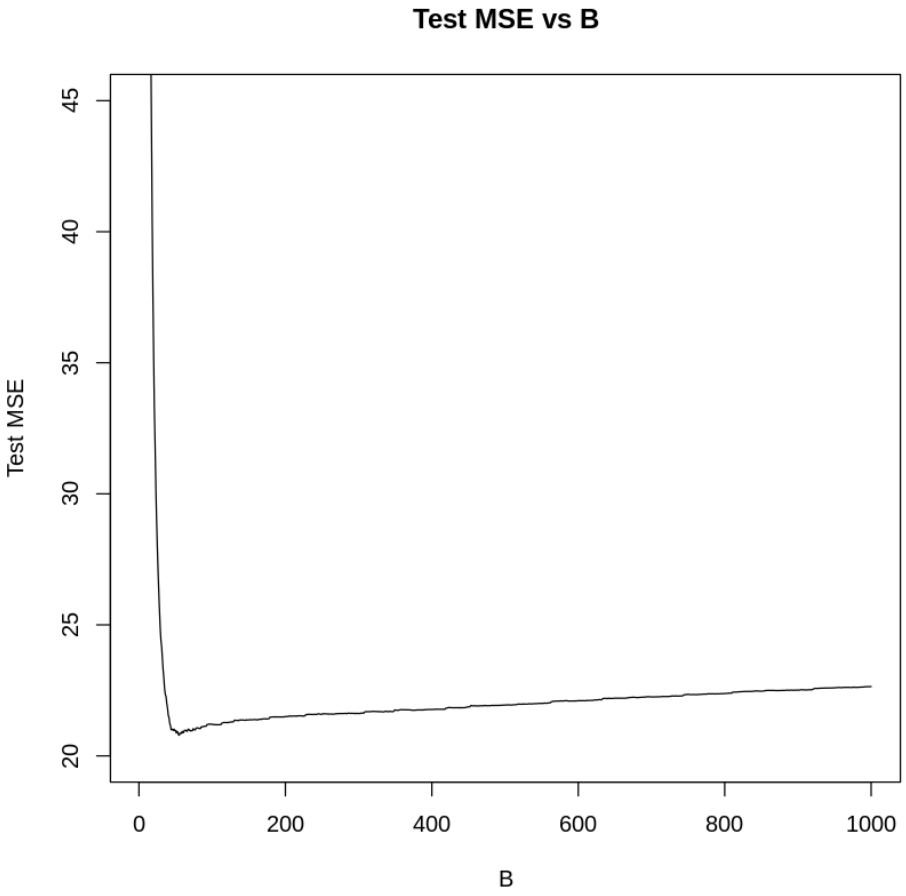


Learning rate parameter is also very crucial and after some adjustments to it I found that lower value of eta takes higher value of B to converge, whereas a high value of B will take lower value of B to converge

Below is the graph for value of eta = 0.001. As can be seen below, it took us B to be more than 4000 to reach the minimum Test MSE.



Below is the graph for a higher value of eta = 0.1. As can be seen below, we reached lowest test MSE with a lower value of B about 50.


Test MSE vs B
Test MSE
20
25
30
35
40
45
0
200
400
600
800
1000
B