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CS 4442 – Assignment 1

Contents

[Question 1 2](#_Toc63869505)

[1a) 2](#_Toc63869506)

[1b) 3](#_Toc63869507)

[1c) 4](#_Toc63869508)

[1d) 5](#_Toc63869509)

[Question 2 6](#_Toc63869510)

[2a) 6](#_Toc63869511)

[2b) 7](#_Toc63869512)

[2c) 8](#_Toc63869513)

[2d) 9](#_Toc63869514)

[2e) 10](#_Toc63869515)

[2f) 11](#_Toc63869516)

[Question 3 12](#_Toc63869517)

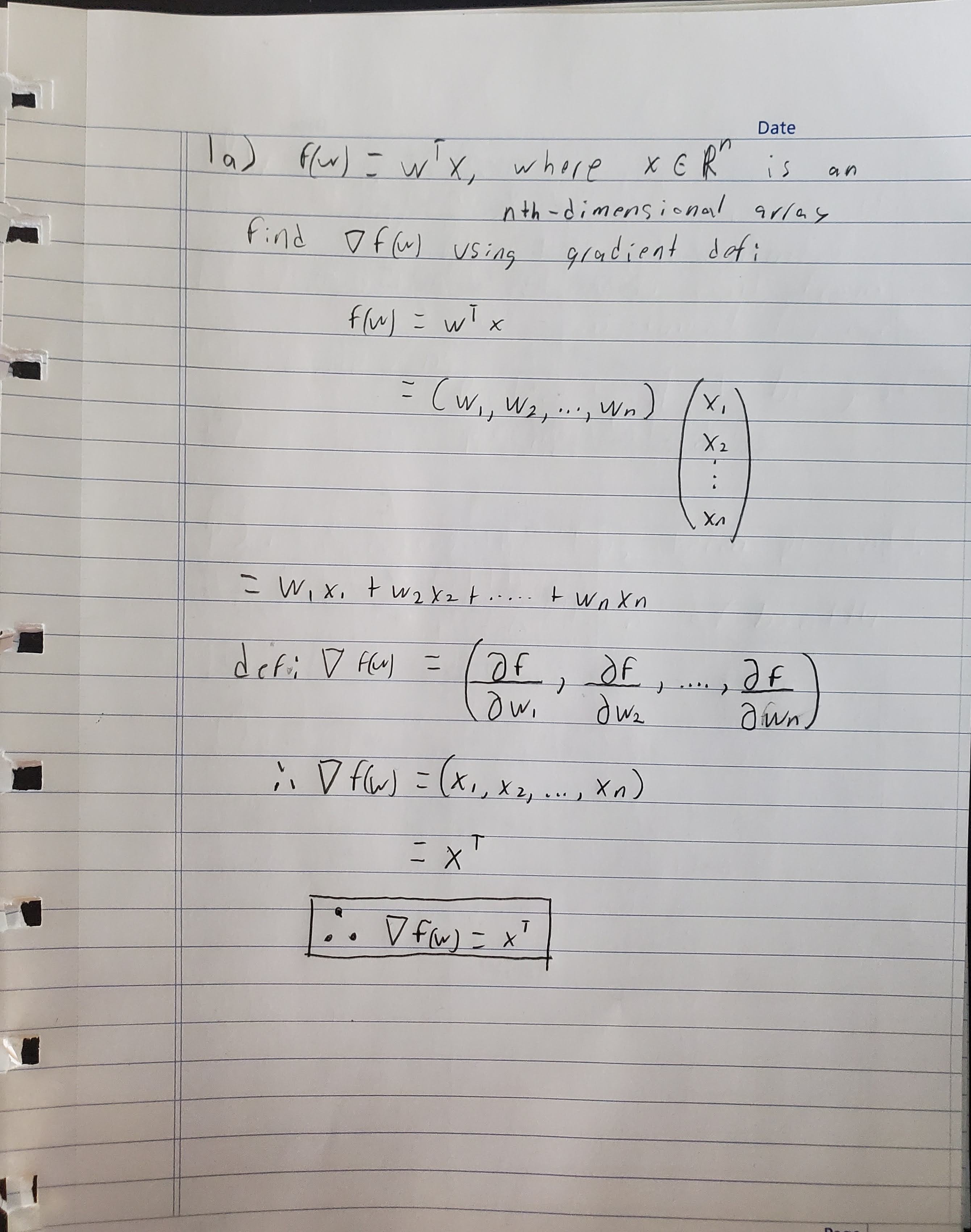
[3a) 12](#_Toc63869518)

[3b) 14](#_Toc63869519)

[3c) 15](#_Toc63869520)

# Question 1

## 1a)



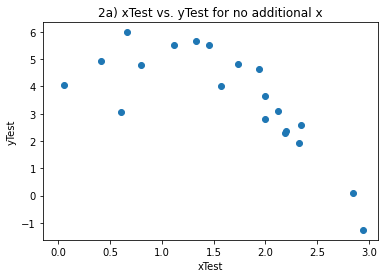
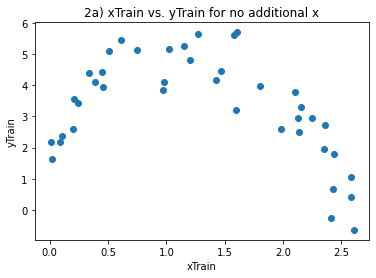
## 1b)

## 1c)

## 1d)

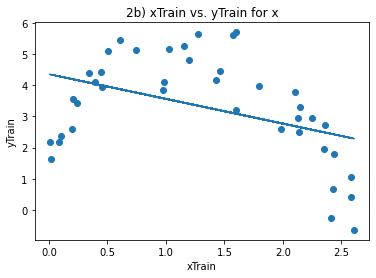
# Question 2

## 2a)



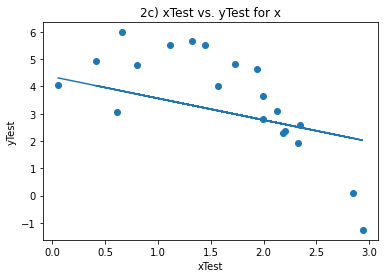
## 2b)

The training error for this regression model is: [2.17394558]



## 2c)

The test error for this regression model is: [2.31187535]

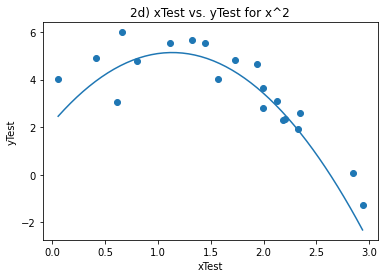
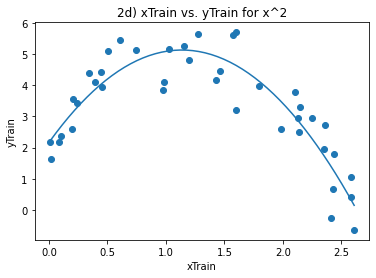


## 2d)

The training error for the x^2 regression model is: [0.4846845]

The test error for the x^2 regression model is: [0.75736357]

The x^2 regression is a better fit than linear

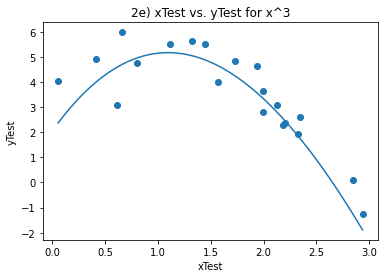
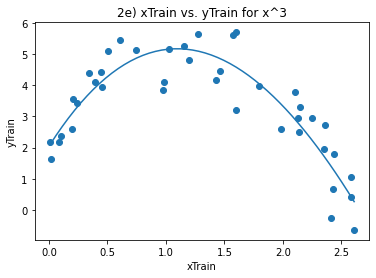


## 2e)

The training error for the x^3 regression model is: [0.48055213]

The test error for the x^3 regression model is: [0.69112454]

The x^3 regression is a better fit than linear and better than x^2

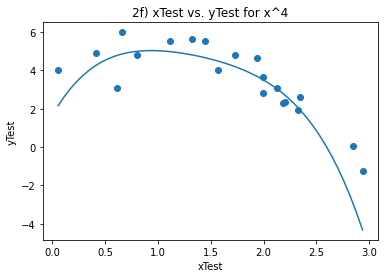
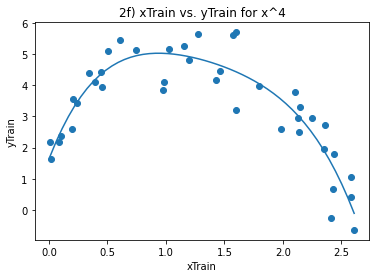


## 2f)

The training error for the x^4 regression model is: [0.43664763]

The test error for the x^4 regression model is: [1.55846948]

The x^4 regression is a better fit than linear but worse than the x^2 and x^3



# Question 3

## 3a)

Train Error values:

Blue - 0.01 : [0.44766944]

Orange - 0.1 : [0.50764684]

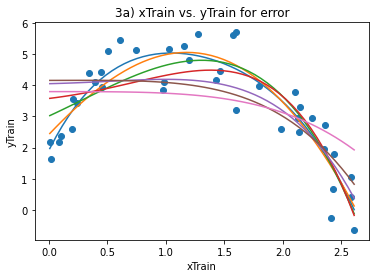
Green- 1 : [0.61438502]

Red - 10 : [0.79919963]

Purple - 100 : [1.06408674]

Brown - 1000 : [1.24504551]

Pink - 10000 : [1.58866293]



Test Error values:

Blue- 0.01 : [1.1142357]

Orange - 0.1 : [0.75921838]

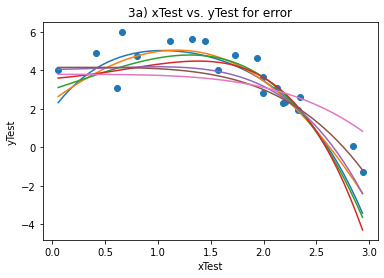
Green - 1 : [1.19209465]

Red - 10 : [1.56971215]

Purple -100 : [0.97921956]

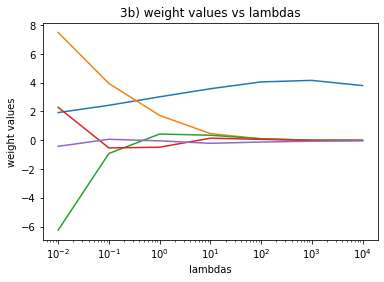
Brown - 1000 : [0.95177873]

Pink - 10000 : [1.50004816]



The best lambda fit is for 0.1 as it had the lowest error for the testing data

## 3b)



## 3c)

Average Errors

0.01 : [0.56797556]

0.1 : [0.61637959]

1 : [0.74211609]

10 : [0.92384521]

100 : [1.17268211]

1000 : [1.32873231]

10000 : [1.76322053]

The best lambda for c) was 0.01 and for a) it was 0.1 so it did changed

