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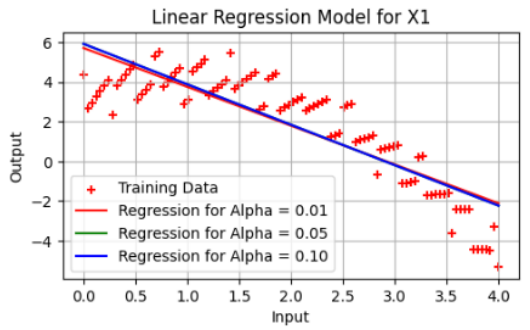
Homework 1

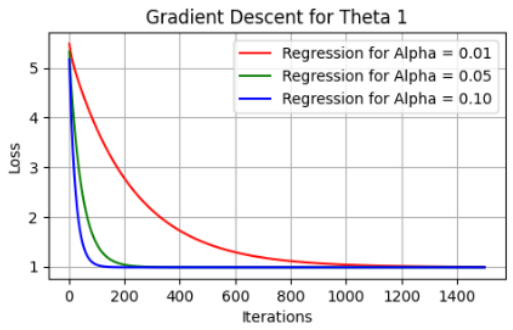
1.
Code Link:
https://github.com/eperezp2/HW1.git

Linear model for each explanatory variable:

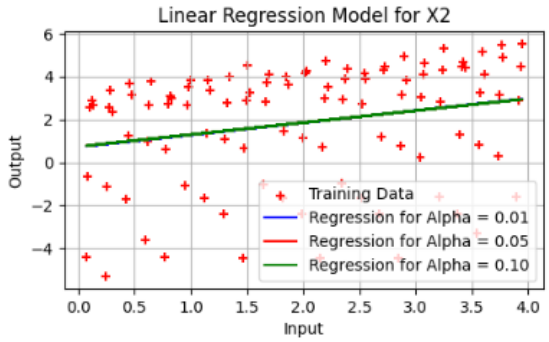
2. Plots:

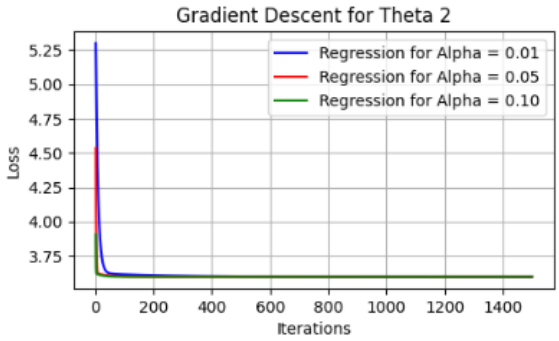
Out[86]: Text(0, 0.5, 'Loss')

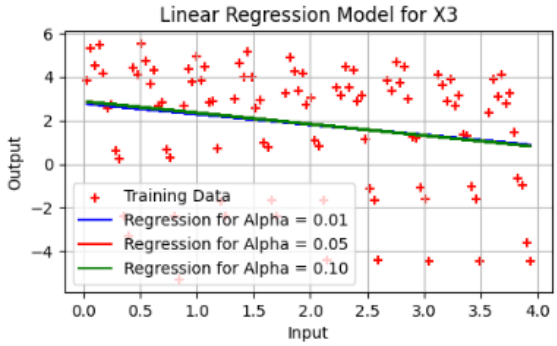


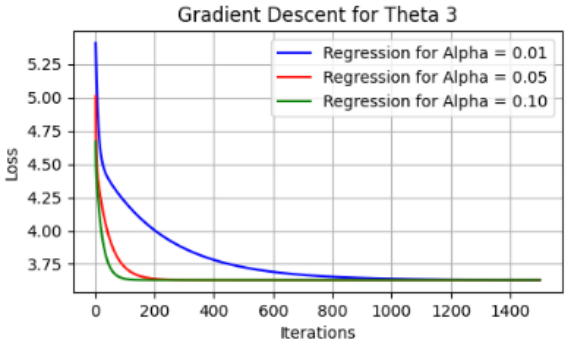


Out[77]: Text(0, 0.5, 'Loss')









3. Which explanatory variable has lower loss cost:

The x1 has the lowest loss cost of about 0.99 throughout each alpha value.

```
Costs for alpha = 0.01
X1:  0.9905894438682062
X2:  3.5993993982305357
X3:  3.6305262475389664

Costs for alpha = 0.05
X1:  0.9849930825406077
X2:  3.5993660181680425
X3:  3.629451124607917

Costs for alpha = 0.10
X1:  0.9849930825405946
X2:  3.599366018168041
X3:  3.6294511246079155
```

4. Based on your training observations, describe the impact of the different learning rates on the final loss and number of training iterations.:

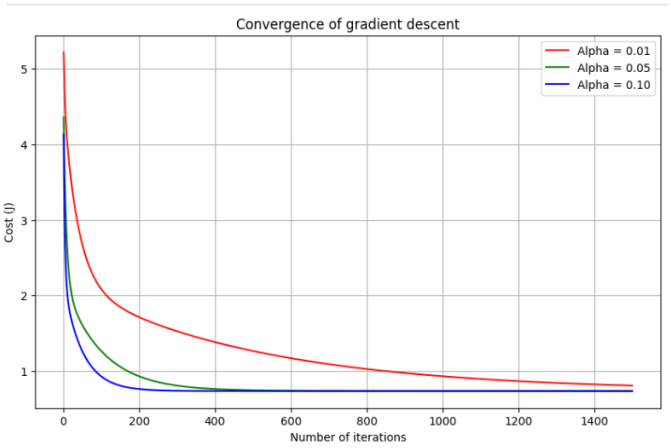
Based on the graphs of iterations x2 provides the best option due to its higher accuracy. However, the linear model does not fit the best. Much like the linear model does not fit for x3, both x2 and x3 would need proper training to help with the linear model and allow a better fit. X1 does provide the lowest cost of production and a slightly better linear model.

2.:

1. Report the final linear model you found the best.

   Overall the best linear model that we found was x1, it had the least amount of loss.

2. Plot loss over the iteration.



3. Based on your training observations, describe the impact of the different learning rates on the final loss and number of training iteration.

4. Predict the value of y for new (X1, X2, X3) values (1, 1, 1), for (2, 0, 4), and for (3, 2, 1)

   (1,1,1) : 0.805

   (2,0,4): -3.05

   (3,2,1): -3.12