

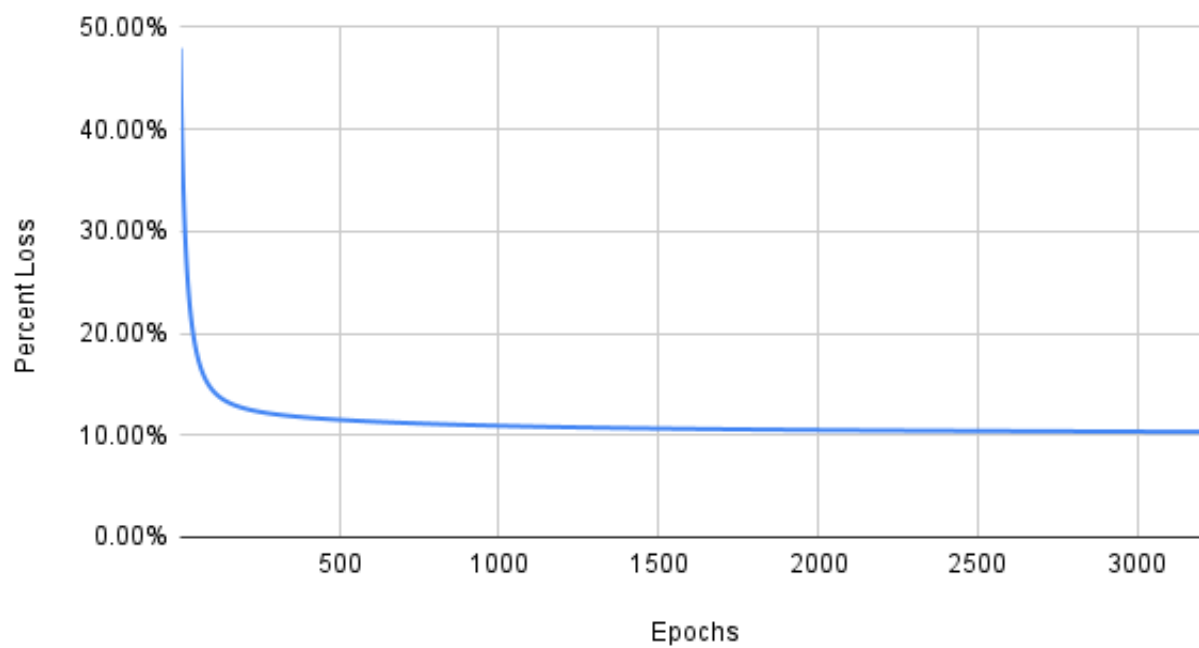
Problem Set 3 - Gradient Descent

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1 Graph - Error of Gradient Descent

Epochs vs. Loss



2 Output of Code

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*****
Problem Set: Problem Set 3: Gradient Descent
Name: Rafe Wilhite
Syntax: java PS3 arg1 arg2 arg3 arg4 arg5
*****
```

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Training Phase:    ps3data.csv
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=> Number of Entries (n): 48
=> Number of Features (p): 15
```

```
Starting Gradient Descent
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```
Epoch    1: Loss of 0.47958  Delta = 4.085% Epsilon = 0.001%
Epoch    2: Loss of 0.46066  Delta = 3.945% Epsilon = 0.001%
Epoch    3: Loss of 0.44311  Delta = 3.809% Epsilon = 0.001%
Epoch    4: Loss of 0.42683  Delta = 3.676% Epsilon = 0.001%
Epoch    5: Loss of 0.41169  Delta = 3.546% Epsilon = 0.001%
Epoch    6: Loss of 0.39761  Delta = 3.420% Epsilon = 0.001%
Epoch    7: Loss of 0.38450  Delta = 3.298% Epsilon = 0.001%
Epoch    8: Loss of 0.37227  Delta = 3.180% Epsilon = 0.001%
Epoch    9: Loss of 0.36085  Delta = 3.066% Epsilon = 0.001%
...
Epoch 3225: Loss of 0.10331  Delta = 0.001% Epsilon = 0.001%
Epoch 3226: Loss of 0.10330  Delta = 0.001% Epsilon = 0.001%
Epoch 3227: Loss of 0.10330  Delta = 0.001% Epsilon = 0.001%
Epoch 3228: Loss of 0.10330  Delta = 0.001% Epsilon = 0.001%
Epoch 3229: Loss of 0.10330  Delta = 0.001% Epsilon = 0.001%
Epoch 3230: Loss of 0.10330  Delta = 0.001% Epsilon = 0.001%
```

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Epochs Required: 3230
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```
W0 (y-intercept): -1.3252e-15
W1:  0.3494
W2: -0.3347
W3: -0.2196
W4: -0.3210
W5: -0.2713
W6: -0.2445
W7: -0.1573
W8:  0.2598
W9:  0.5052
```

W10: 0.0510
W11: 0.0457
W12: -0.1933
W13: 0.1881
W14: 0.1756
W15: 0.0255

Testing Phase:

Loss of Testing Data: 363.6746

Test Record 1:	True:	790.73	Prediction:	800.23	Error:	9.50
Test Record 2:	True:	899.26	Prediction:	923.62	Error:	24.35
Test Record 3:	True:	904.16	Prediction:	881.37	Error:	22.78
Test Record 4:	True:	950.67	Prediction:	926.44	Error:	24.23
Test Record 5:	True:	972.46	Prediction:	927.73	Error:	44.73
Test Record 6:	True:	912.20	Prediction:	900.33	Error:	11.87
Test Record 7:	True:	967.80	Prediction:	1009.28	Error:	41.48
Test Record 8:	True:	823.76	Prediction:	887.05	Error:	63.29
Test Record 9:	True:	1003.50	Prediction:	935.80	Error:	67.70
Test Record 10:	True:	895.70	Prediction:	899.06	Error:	3.36
Test Record 11:	True:	911.82	Prediction:	934.50	Error:	22.68
Test Record 12:	True:	954.44	Prediction:	926.75	Error:	27.69

=> Number of Test Entries (n): 12