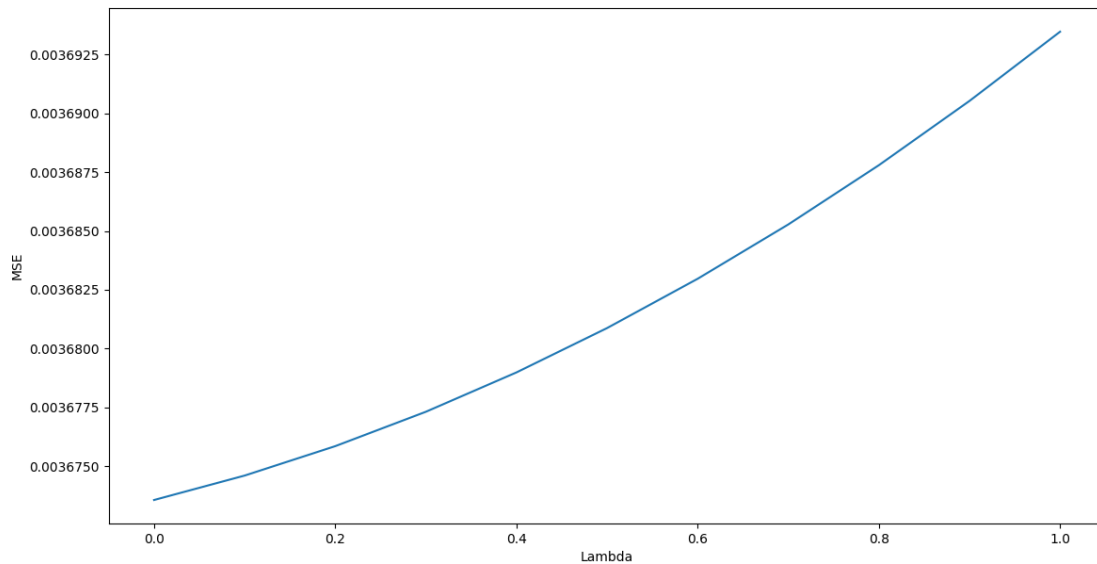


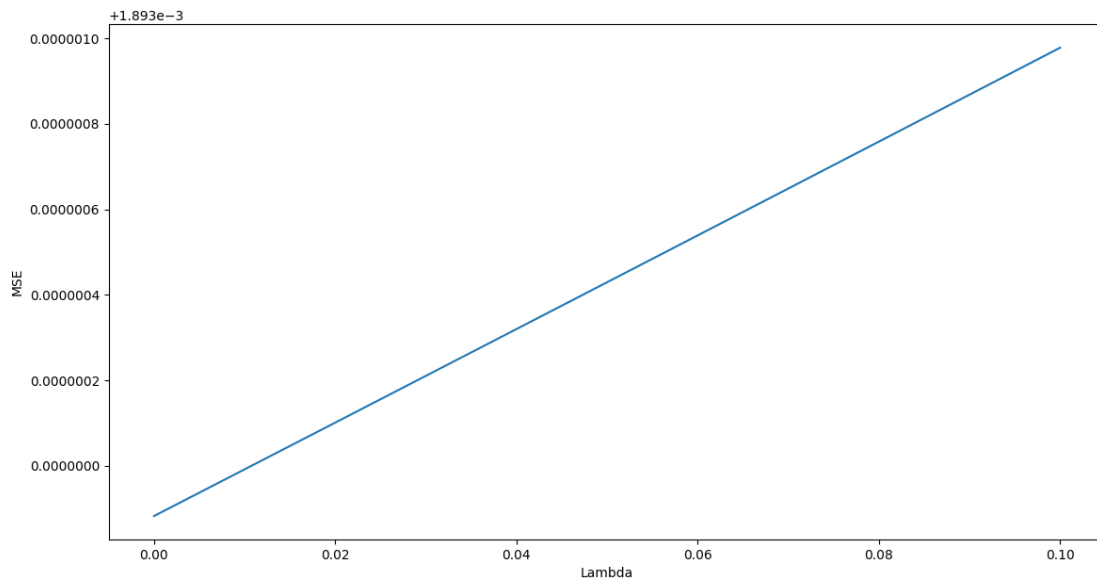
**Roll Number: 20161191**

**Name: Animi Reddy**

**Lambda vs MSE graph for L1-Regularisation:**



**Lambda vs MSE graph for L2-Regularisation:**



**output of L1-Regularisation for various lambda:**

MSE = 0.0036735711942558684

MAE = 0.032985698442968045

MPE = -0.041640869187917706

Lambda = 0.1  
MSE = 0.0036746090239832756  
MAE = 0.032938269597210176  
MPE = -0.04171059631509883  
Lambda = 0.2  
MSE = 0.003675858320902848  
MAE = 0.03289440290076558  
MPE = -0.04178032344227943  
Lambda = 0.30000000000000004  
MSE = 0.0036773190850147353  
MAE = 0.03285552046728948  
MPE = -0.0418500505694622  
Lambda = 0.4  
MSE = 0.0036789913163186743  
MAE = 0.032817311773889364  
MPE = -0.04191977769664237  
Lambda = 0.5  
MSE = 0.003680875014814886  
MAE = 0.03277910308048952  
MPE = -0.04198950482382396  
Lambda = 0.6000000000000001  
MSE = 0.00368297018050323  
MAE = 0.03274089438708947  
MPE = -0.04205923195100438  
Lambda = 0.7000000000000001  
MSE = 0.003685276813383865  
MAE = 0.03270268569368977  
MPE = -0.04212895907818662  
Lambda = 0.8  
MSE = 0.0036877949134566127  
MAE = 0.03266447700028974  
MPE = -0.042198686205367306  
Lambda = 0.9  
MSE = 0.0036905244807216193  
MAE = 0.03262626830688996  
MPE = -0.042268413332549236  
Lambda = 1.0  
MSE = 0.0036934655151788184  
MAE = 0.032588059613490185  
MPE = -0.04233814045973099

**output of L2-Regularisation for various lambda:**

Lambda = 0.0  
MSE = 0.0018928827460640318  
MAE = 0.026077676198986214  
MPE = 0.00318506172152417  
Lambda = 0.01  
MSE = 0.0018929919210726052  
MAE = 0.026078589443550362  
MPE = 0.0031837340219662224  
Lambda = 0.02

MSE = 0.0018931011736174573  
MAE = 0.026079502663176504  
MPE = 0.003182406358664928  
Lambda = 0.03  
MSE = 0.0018932105036921824  
MAE = 0.026080415857866527  
MPE = 0.003181078731623752  
Lambda = 0.04  
MSE = 0.001893319911290241  
MAE = 0.026081329027620698  
MPE = 0.0031797511408368064  
Lambda = 0.05  
MSE = 0.001893429396405241  
MAE = 0.026082242172440914  
MPE = 0.0031784235863078123  
Lambda = 0.06  
MSE = 0.0018935389590306786  
MAE = 0.02608315529232787  
MPE = 0.003177096068033329  
Lambda = 0.07  
MSE = 0.0018936485991600436  
MAE = 0.026084068387282132  
MPE = 0.00317576858600923  
Lambda = 0.08  
MSE = 0.0018937583167869104  
MAE = 0.02608498145730528  
MPE = 0.0031744411402370907  
Lambda = 0.09  
MSE = 0.001893868111904762  
MAE = 0.026085894502397775  
MPE = 0.003173113730712418  
Lambda = 0.1  
MSE = 0.0018939779845071948  
MAE = 0.026086807522561373  
MPE = 0.003171786357437938

#### **output of Kfold:**

```
KFold(n_splits=5, random_state=None, shuffle=False)
Iteration Number = 0
MSE Error = 0.0024321326597404607
Iteration Number = 1
MSE Error = 0.0031141190254261133
Iteration Number = 2
MSE Error = 0.0023971068073798877
Iteration Number = 3
MSE Error = 0.001543071917380427
Iteration Number = 4
MSE Error = 0.002131483744103393
Final MSE Error on Test Data = 0.001972228198383395
```

3. If we observe the graph of L1,L2 regularisations we can see that as  $\lambda$  increases error increases  $\Rightarrow$  bias increases and variance decreases  $\Rightarrow$  it avoids overfitting