Stochastic Control & Optimization Project 3

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Lasso Solution

Fit model using GLMNET CV to find best Lambda

```
lasso.fit = cv.glmnet(X,y,alpha = 1)
lasso.betas = matrix(coef(lasso.fit, s = "lambda.min"))[2:65,] # Betas for LASSO Regression
lasso.betas
```

```
##  [1]  0.842993991  0.000000000  0.000000000  0.000000000  0.014870696
##  [6]  0.000000000  0.000000000  0.000000000  1.021628791  0.014202113
## [11]  0.000000000  0.000000000  0.030432298  0.000000000  0.000000000
## [16]  0.000000000  0.934084416  0.000000000  0.000000000  0.000000000
## [21]  0.000000000  0.000000000  0.000000000  0.068169740  1.018728997
## [26]  0.030679867  0.000000000  0.000000000  0.000000000  0.038603126
## [31]  0.000000000  0.020839551  0.911595395  0.000000000  0.005206754
## [36]  0.000000000  0.000000000  0.014050658  0.012266720  0.000000000
## [41]  0.929796954  0.000000000  0.021697198  0.000000000  0.000000000
## [46]  0.049485374  0.000000000  0.000000000  0.974533483  0.000000000
## [51]  0.000000000  0.000000000  0.000000000 -0.012788623  0.000000000
## [56]  0.019457655  0.987495655  0.000000000  0.003934940  0.003312479
## [61]  0.000000000  0.000000000  0.034465347  0.000000000
```

Write Function to Evaluate Error of Betas

```
calculate_error = function(X, betas_act,betas_pred){
  error = (X %*% betas_pred - X %*% betas_act)^2
  sum_error = sum(error) / sum((X %*% betas_act)^2)
  return (sum_error)
}
```

Calculate Prediction Error for LASSO

```
lasso_error = calculate_error(X,beta_real,lasso.betas)
cat('LASSO Prediction Error: ',lasso_error)
```

```
## LASSO Prediction Error:  0.006700528
```

MIQP Solution

Compare Results