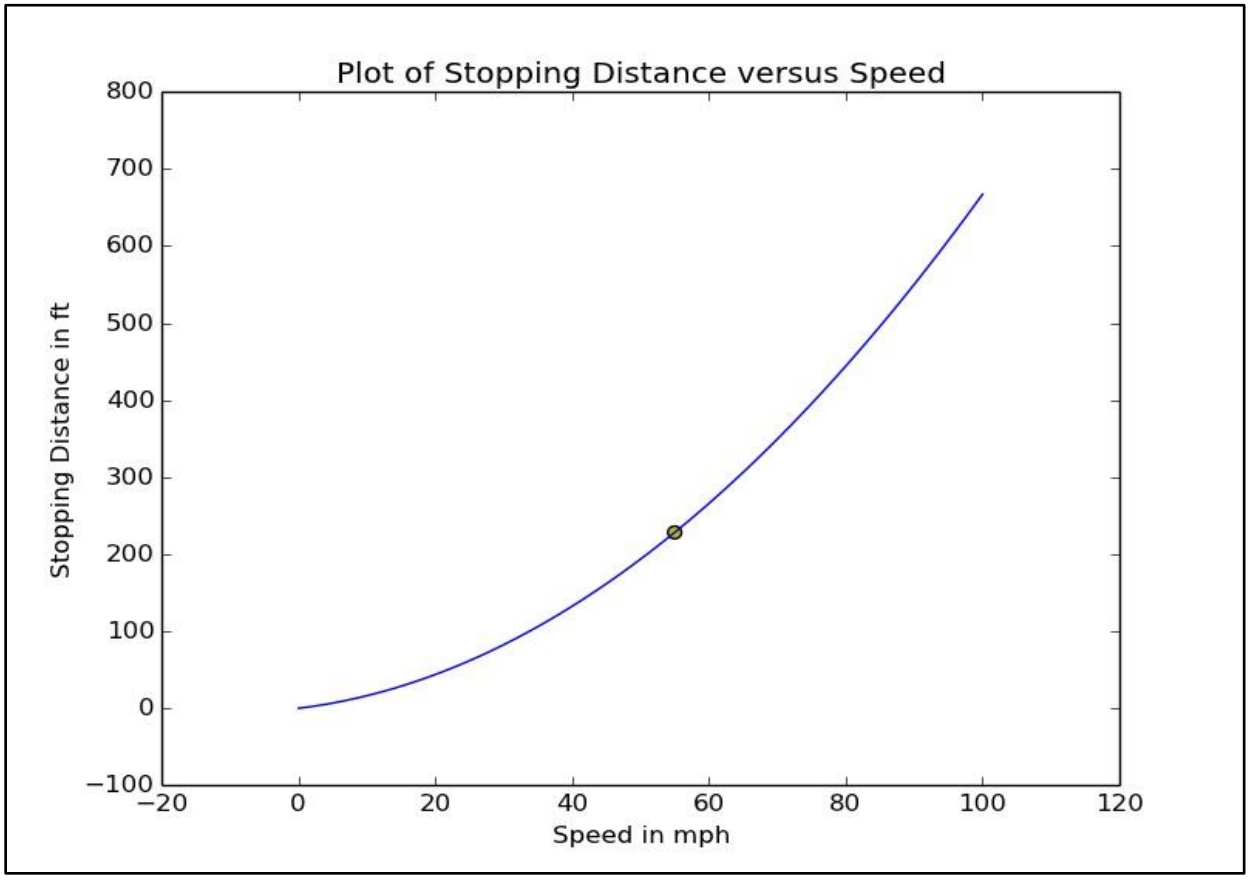
MSPA 400 Session 2 Python Solutions

Module 1:

Exercise: Refer to Lial Section 2.1 Problem 46 on page 53. Solve for a # and b using the Echlon Method. Plot the resulting quadratic function. Compare the code and plot with the answer sheet. (This code also shows how to plot a single point using the scatter() routine.)

```
figure()
x=linspace(0,100,100)
y=0.056057*x*x+1.06657*x
y55=0.056057*(55)**2+1.06657*(55)
xlabel('Speed in mph')
ylabel('Stopping Distance in ft')
title ('Plot of Stopping Distance versus Speed')
scatter(55,y55,c='y',s=40)
plot(x,y)
show()
```



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Module 2:

Exercise: Refer to Lial Section 2.3 Example 7. Write the code which reproduces the calculations shown in that example. For the array which results, slice it to show 1) second row, 2) the third column and 3) the single element common to (1) and (2). Use the array methods demonstrated in the code. Compare your code and results to the answer sheet.

```
C=array([[22,25,38],[31,34,35]])
print ('\nArray C')
print C
K=array([[5,10,8],[11,14,15]])
print ('\nArray K')
print K
M=C-K
print ('\nResult of Subtraction')
print M
print ('\nSecond Row of Result is %s') %M[1,:]
print ('Third Column of Result is %s') %M[:,2]
print ('Common Element is %r') %M[1,2]
```

```
Array C
[[22 25 38]
 [31 34 35]]
Array K
[[ 5 10  8]
 [11 14 15]]
Result of Subtraction
[[17 15 30]
 [20 20 20]]

Second Row of Result is [20 20 20]
Third Column of Result is [30 20]
Common Element is 20
```

Module 3:

Exercise 1: Refer to Lial Section 2.5 Example 2. Write the code to reproduce the results in the example. Form the matrix A, find its inverse and verify such by multiplying the two to form the identity matrix. Show the code, matrix A, inverse of A and the Identity matrix.

```
A =[[1, 0, 1], [2, -2, -1], [3, 0, 0]]
A= matrix(A)
print ('\nMatrix A')
print A
print ('\nInverse of A')
IA= inv(A)
print IA
print ('\nIdentity Matrix')
```

```
I=dot(IA,A)
print I
```

Matrix A

```
[[ 1  0  1]
 [ 2 -2 -1]
 [ 3  0  0]]
```

Inverse of A

```
[[ 0.         0.         0.33333333]

 [-0.5       -0.5        0.5       ]

 [ 1.         0.        -0.33333333]]
```

Identity Matrix

```
[[ 1.  0.  0.]
 [ 0.  1.  0.]
 [ 0.  0.  1.]]
```

Exercise 2: Refer to Lial Section 2.5 page 96 problem #1. Write the code which solves the problem. Use linalg.solve(,).

```
M= [[2, 4, 2], [2, 1, 2], [2, 1, 3]]
M= matrix(M)
O= [72,48,60]
O= transpose(matrix(O))
result= linalg.solve(M,O)
print ('\nDaily Orders\n')
print int_(result)
```

Daily Orders

```
[[ 8]
 [ 8]
 [12]]
```