Matlab Assignments

Student Name: Karim Shoorbajee

Lab Section No.: 36

Class Number:

Major (BME, CEE, <mark>CS,</mark> ECE, EMSE, MAE, Undecided, Others)**:**

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SEAS-001 – Lab Assignment and HW #2A

Matlab Exercises

Problem 1.	**10 points**	_____
Problem 2.	**10 points**	_____
Problem 3.	**10 points**	_____
Problem 4.	**20 points**	_____

Total: **50 points**   **Grade:_____**

<u>Matlab Exercises</u>
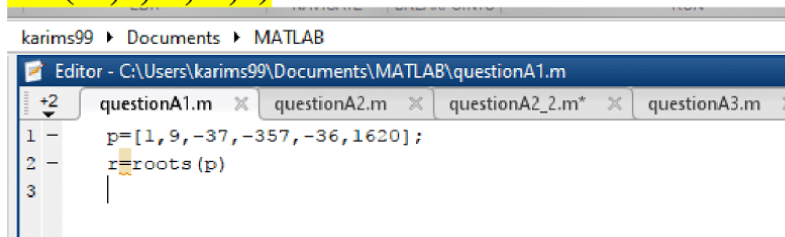# HW#2A
SEAS-001

1. Find the zeros (roots) of the following polynomial:

$$x^5 + 9x^4 - 37x^3 - 357x^2 - 36x + 1620 = 0$$

x= (-9,6,-5,-3,2)

karims99 ▸ Documents ▸ MATLAB

Editor - C:\Users\karims99\Documents\MATLAB\questionA1.m

| +2 | questionA1.m ✕ | questionA2.m ✕ | questionA2_2.m* ✕ | questionA3.m ✕ |

```
1    p=[1,9,-37,-357,-36,1620];
2    r=roots(p)
3
```
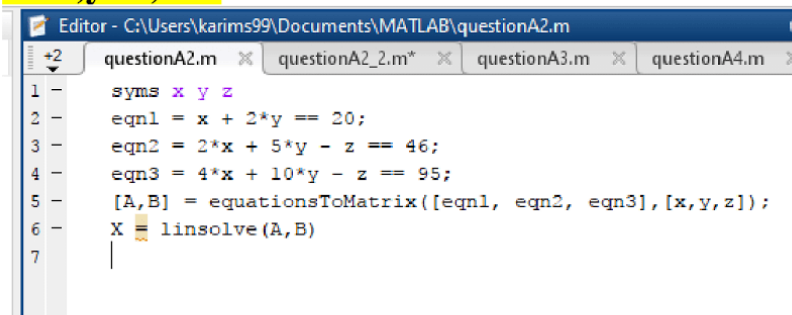
2. Given the following three equations and three unknowns, **solve for x, y, and z:**

$$x + 2y = 20$$
$$2x + 5y - z = 46$$
$$4x + 10y - z = 95$$

X=2,y=9,z=3

```
Editor - C:\Users\karims99\Documents\MATLAB\questionA2.m
+2    questionA2.m  ×   questionA2_2.m*  ×   questionA3.m  ×   questionA4.m  ×
1 -     syms x y z
2 -     eqn1 = x + 2*y == 20;
3 -     eqn2 = 2*x + 5*y - z == 46;
4 -     eqn3 = 4*x + 10*y - z == 95;
5 -     [A,B] = equationsToMatrix([eqn1, eqn2, eqn3],[x,y,z]);
6 -     X = linsolve(A,B)
7 |
```
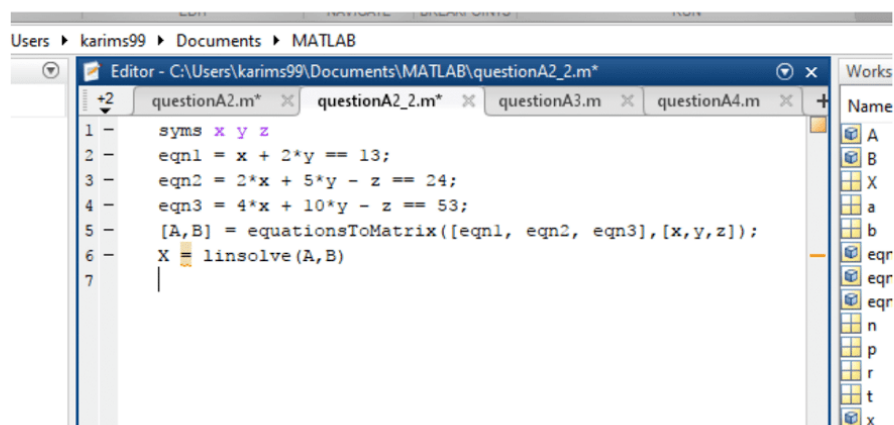
note: these equations can be rewritten in matrix form as

$$\begin{bmatrix} 1 & 2 & 0 \\ 2 & 5 & -1 \\ 4 & 10 & -1 \end{bmatrix} \begin{Bmatrix} x \\ y \\ z \end{Bmatrix} = \begin{Bmatrix} 20 \\ 46 \\ 95 \end{Bmatrix}$$

Now again **solve for x, y, and z when the right hand side changes to**

$$x + 2y = 13$$
$$2x + 5y - z = 24$$
$$4x + 10y - z = 53$$

==X=7,y=3,z=5==

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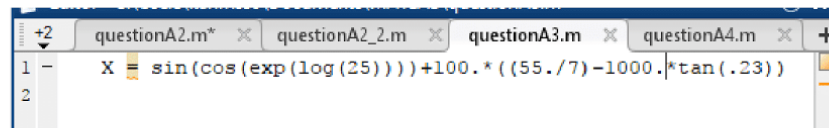
```
1 -    syms x y z
2 -    eqn1 = x + 2*y == 13;
3 -    eqn2 = 2*x + 5*y - z == 24;
4 -    eqn3 = 4*x + 10*y - z == 53;
5 -    [A,B] = equationsToMatrix([eqn1, eqn2, eqn3],[x,y,z]);
6 -    X = linsolve(A,B)
7 -    |
```

3. Use MATLAB to compute the following expression :

$$\sin(\cos(e^{\ln 25})) + 100(55/7 - 1000\tan(.23))$$

-2.2628e+04

```
+2   questionA2.m*  ×   questionA2_2.m  ×   questionA3.m  ×   questionA4.m  ×   +
1 —    X = sin(cos(exp(log(25))))+100.*((55./7)-1000.*tan(.23))
2
```
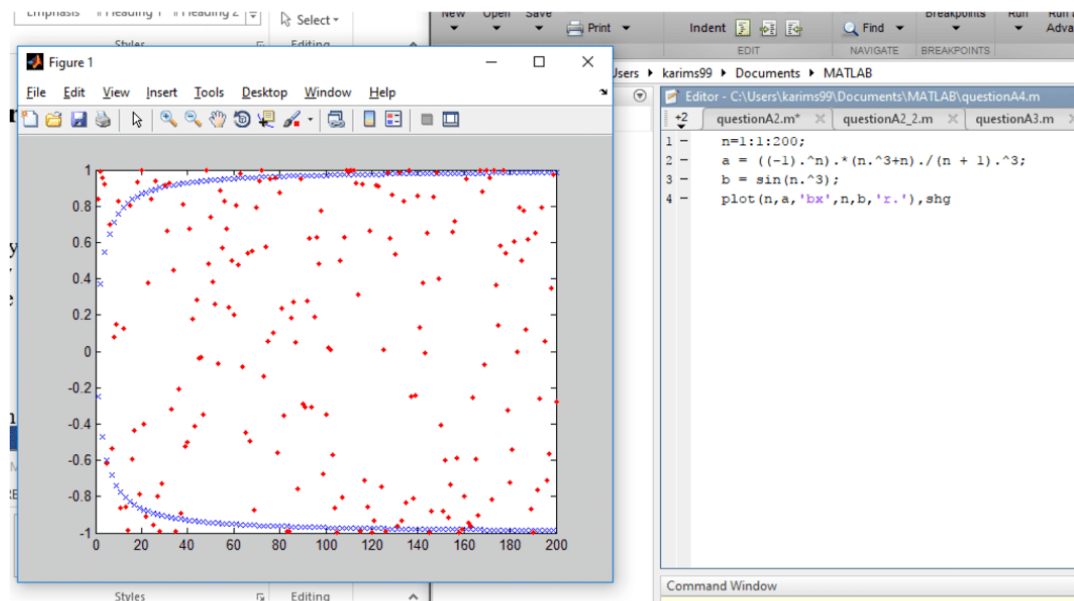
4. Plot (on the same graph) the first 200 terms in the sequences

$$a_n = (-1)^n (n^3 + n)/(n+1)^3 \quad \text{and} \quad b_n = \sin(n^3).$$

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SEAS-001 – Lab Assignment and HW #2B

Problem 1.	**10 points**		_____
Problem 2.	**10 points**		_____
Problem 3.	**10 points**		_____
Total:	**30 points**	**Grade:**_____	

<u>Matlab Exercises</u>
HW#2B
SEAS-001

Plot the following functions and find the Maximum and Minimum values attained for each of them within the given range of values.

Problem 1.

a) Generate values for <u>*x between 0 and 4 in steps of 0.25.*</u>
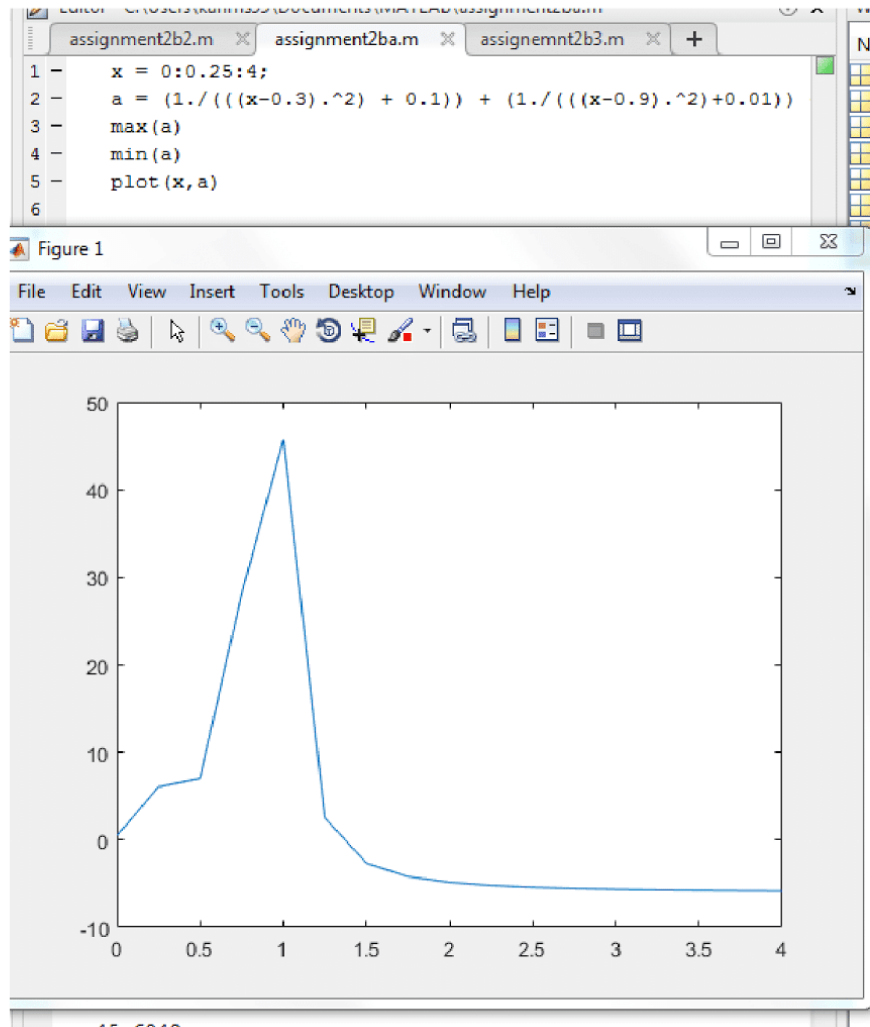
b) Calculate the Maximum and Minimum values attained for the function f_1.

Max = 45.6949

Min = -5.8235

$$f_1 = \frac{1}{(x-0.3)^2 + 0.1} + \frac{1}{(x-0.9)^2 + 0.01} - 6$$

c) Plot *x* vs. *f₁*


```
assignment2b2.m    assignment2ba.m    assignemnt2b3.m    +

1 -    x = 0:0.25:4;
2 -    a = (1./(((x-0.3).^2) + 0.1)) + (1./(((x-0.9).^2)+0.01))
3 -    max(a)
4 -    min(a)
5 -    plot(x,a)
6
```

Problem 2.

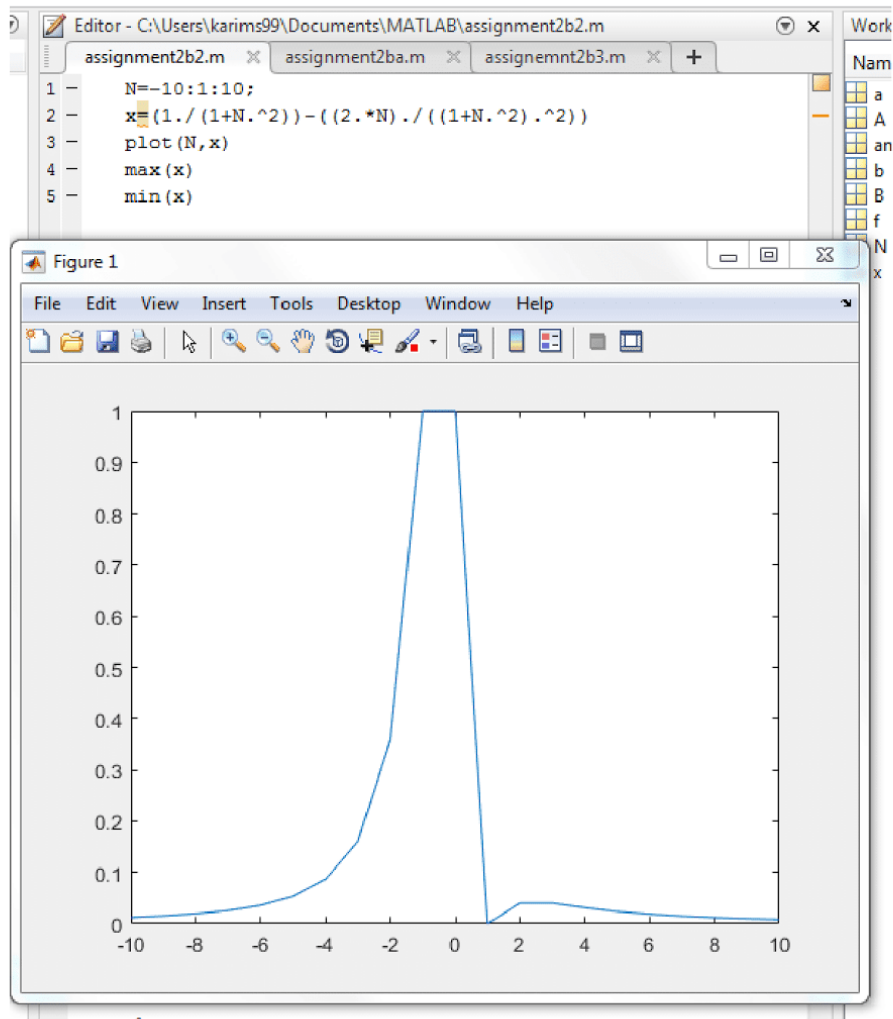a) Generate values for *N between -10 and 10 in steps of 1* .

-10,-9,-8

b) Calculate the Maximum and Minimum values attained for the function f_2.

Max: 1

Min: 0

$$ f_2 = \frac{1}{(1+N^2)} - \frac{2N}{(1+N^2)^2} $$

c) Plot *N vs. f_2*

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Problem 3.

a) Generate values for *M between -2 and 2 in steps of 0.25* .

Max: 0.25

Min: -6

b) Calculate the Maximum and Minimum values attained for the function f₃.

$$f_3 = \left(\frac{-1}{3}\right)M^2 + 2\left(\frac{1}{2} - \frac{1}{3}M\right)M$$
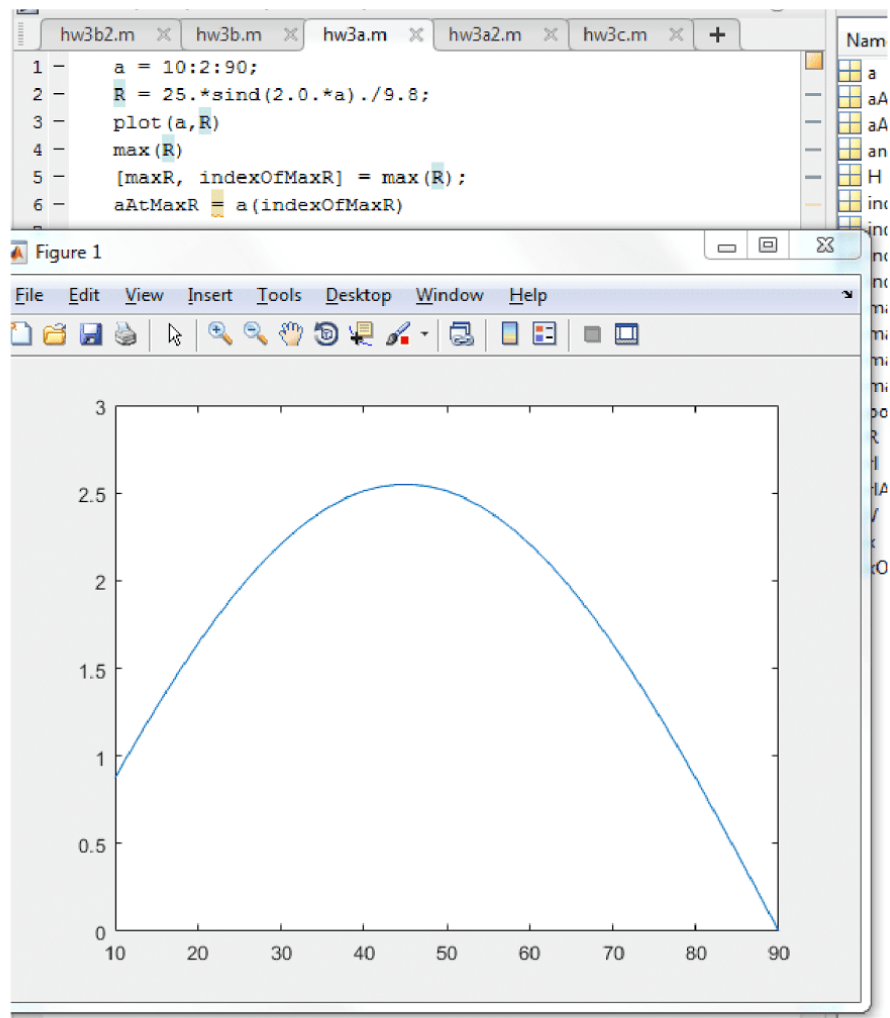
c) Plot *M vs. f₃*

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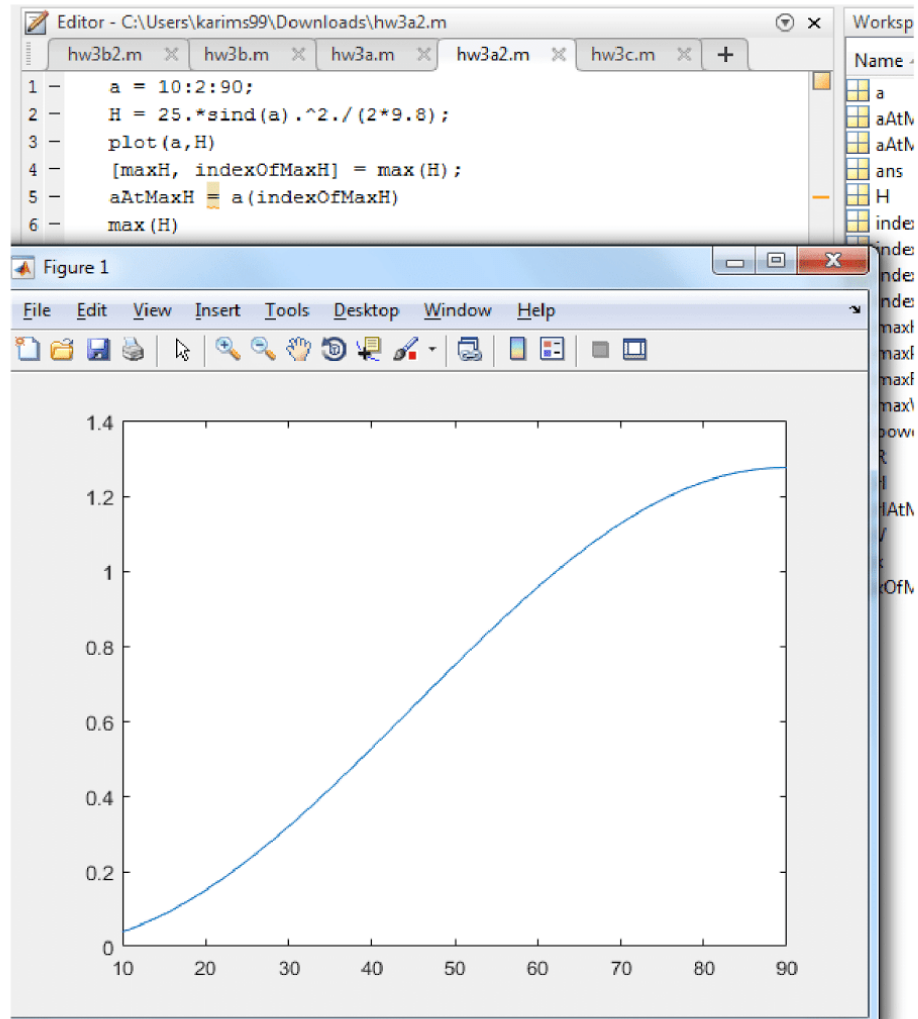
SEAS 1001 LAB 3 Problem set A

Assignment 3a:

Max Range: 2.5495
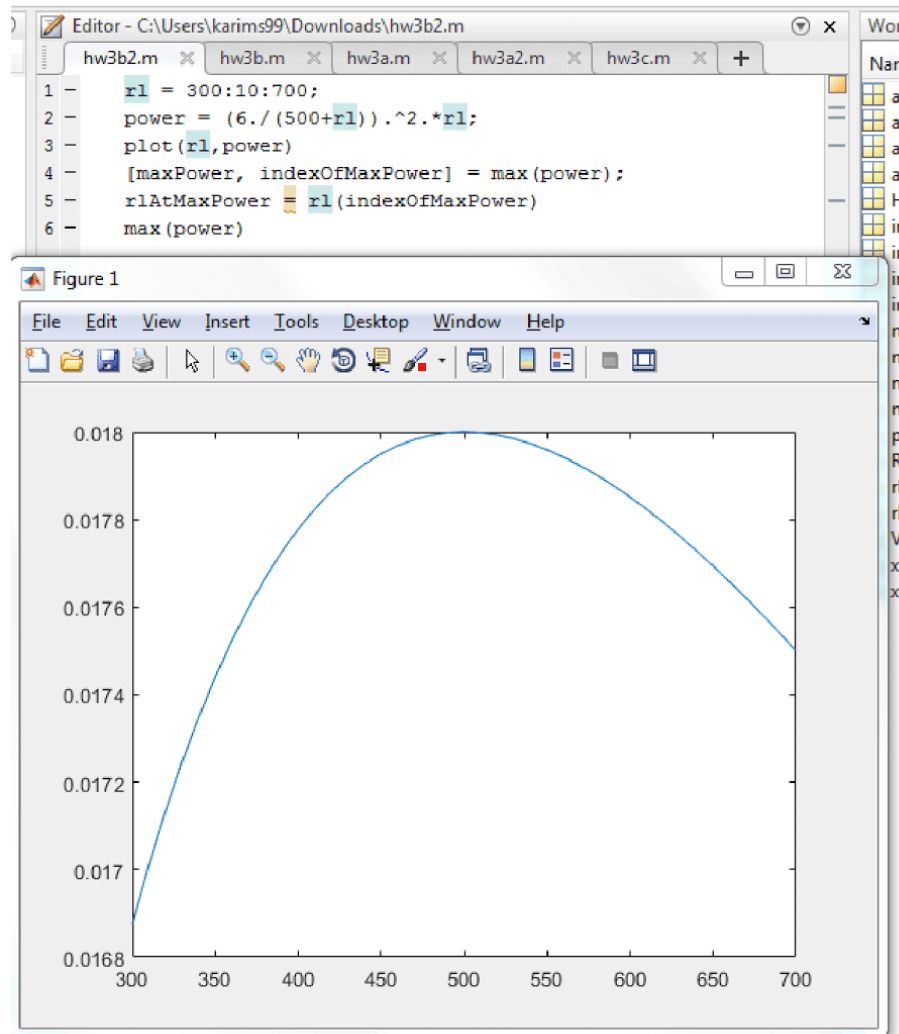
Degrees that yield max range: 44

Max Height: 1.2755

Degrees that yield max height: 90

2) Value of Rl that yields max power: 500

Editor - C:\Users\karims99\Downloads\hw3b2.m

hw3b2.m   hw3b.m   hw3a.m   hw3a2.m   hw3c.m   +

```
1   rl = 300:10:700;
2   power = (6./(500+rl)).^2.*rl;
3   plot(rl,power)
4   [maxPower, indexOfMaxPower] = max(power);
5   rlAtMaxPower = rl(indexOfMaxPower)
6   max(power)
```

Figure 1

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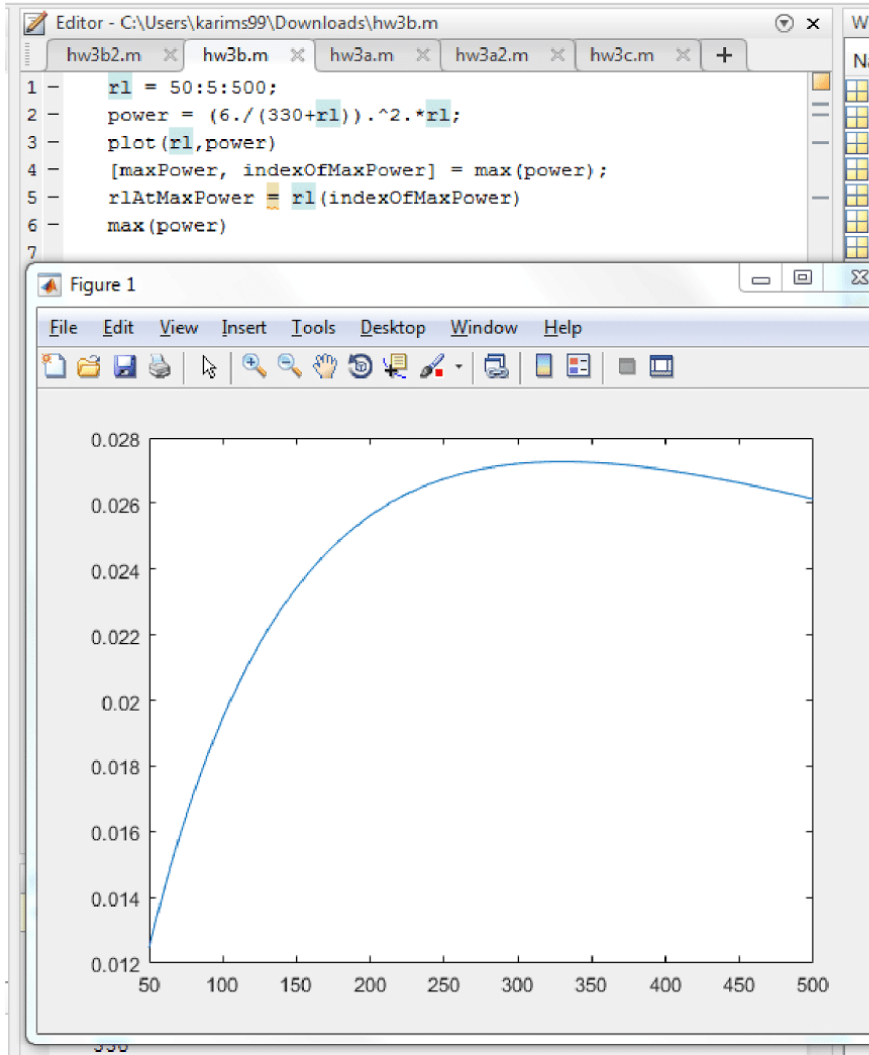

3) The relationship is as follows: To attain maximum power, load resistance and supply resistance should be equal

Karim Shoorbajee SEAS 1001 LAB 3 Problem set B

Assignment 3b:

1) Value of Rl that yields max power: 330

Karim Shoorbajee Lab 3 problem set 3c

Assignment 3c:

Max volume: 2,030 cm^3

Length = 41.2 cm

Width = 11.2 cm

Height 4.4 cm

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```
assignment2b2.m  X   assignment2ba.m  X   assignemnt2b3.m  X  +

1 —    x = -2:0.25:2;
2 —    f = ((-1./3).*x.^2) + (2.*((1./2) - (1./3).*x).*x)
3 —    max(f)
4 —    min(f)
5 —    plot(x,f)
6
```