

## HOMEWORK-1

### SOLUTIONS

1. Evaluate the following expressions in MATLAB for given value of x.

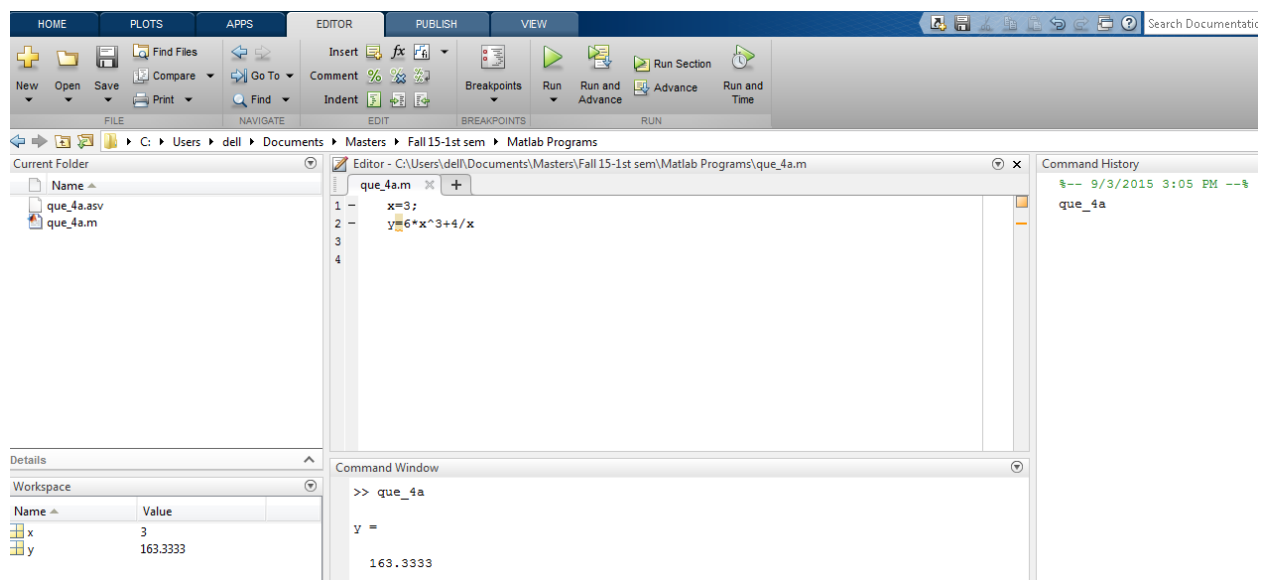
4a.  $y=6x^3 + 4/x$ , where  $x=3$

**Solution:**

**>> x=3;**

**>> y=6\*x^3+4/x**

**y = 163.3333**



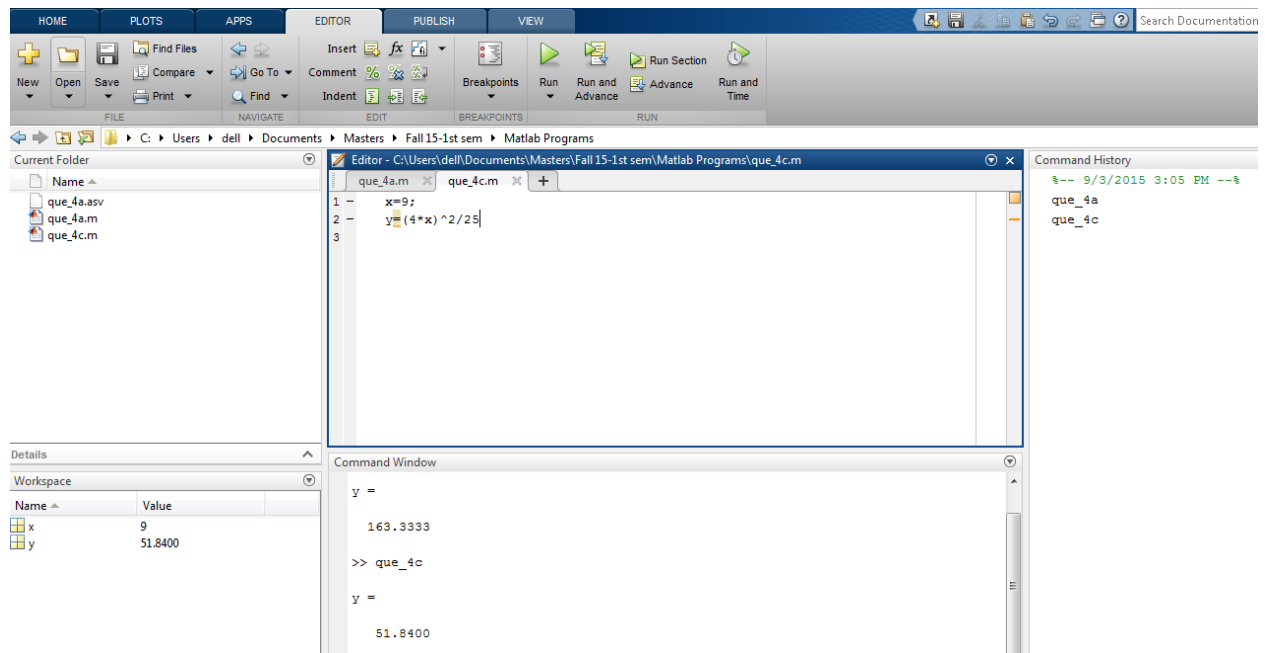
4c.  $y=(4x)^2/25$  where  $x=9$

**Solution:**

**>> x=9;**

**>> y=(4\*x)^2/25**

**y = 51.8400**



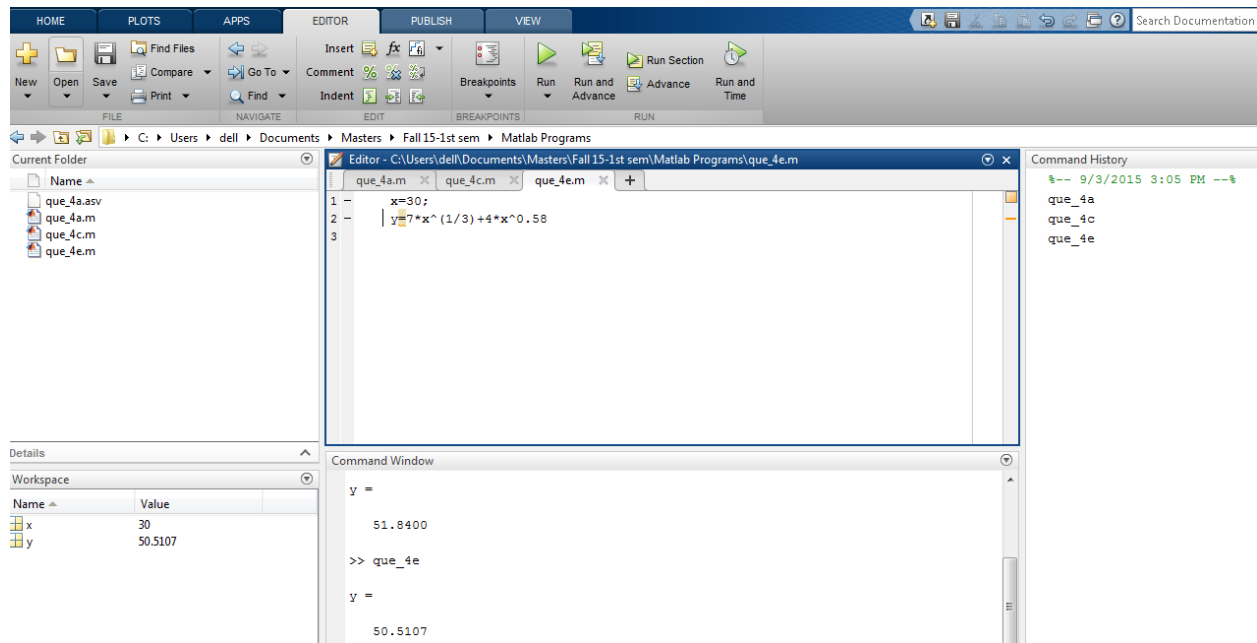
4e.  $y = 7(x^{1/3}) + 4x^{0.58}$  where  $x=30$

**Solution:**

**>> x=30;**

**>> y=7\*x^(1/3)+4\*x^0.58**

**y = 50.5107**



5. Assuming that variables a,b,c,d and f are scalars,write MATLAB statements to compute and display the following expressions.

$$x=1+(a/b)+(c/f^2) \quad s=(b-a)/(d-c) \quad r=1/(1/a+1/b+1/c+1/d) \quad y=ab(1/c)(f^2/2)$$

where a=1.12, b=2.34, c=0.71,d=0.81and f=19.83

**Solution:**

```
>> a=1.12;
```

```
>> b=2.34;
```

```
>> c=0.72;
```

```
>> d=0.81;
```

```
>> f=19.83;
```

```
>> x=1+(a/b)+(c/f^2)
```

```
x =
```

```
1.4805
```

```
>> s=(b-a)/(d-c)
```

```
s =
```

```
13.5556
```

```
>> r=1/((1/a)+(1/b)+(1/c)+(1/d))
```

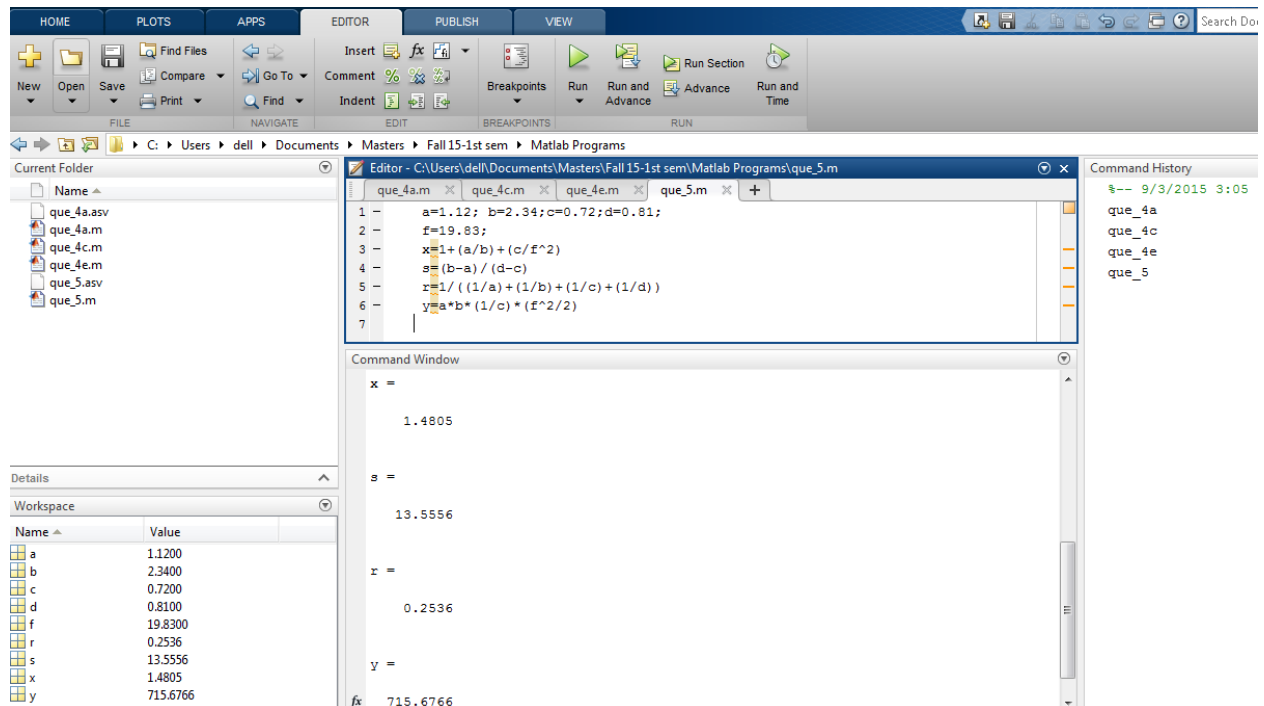
```
r =
```

```
0.2536
```

```
>> y=a*b*(1/c)*(f^2/2)
```

```
y =
```

```
715.6766
```



10. Evaluate the following expressions in MATLAB, for the values of  $x=5+8i$ ,  $y=-6+7i$ .

a.  $u=x+y$

**Solution:**

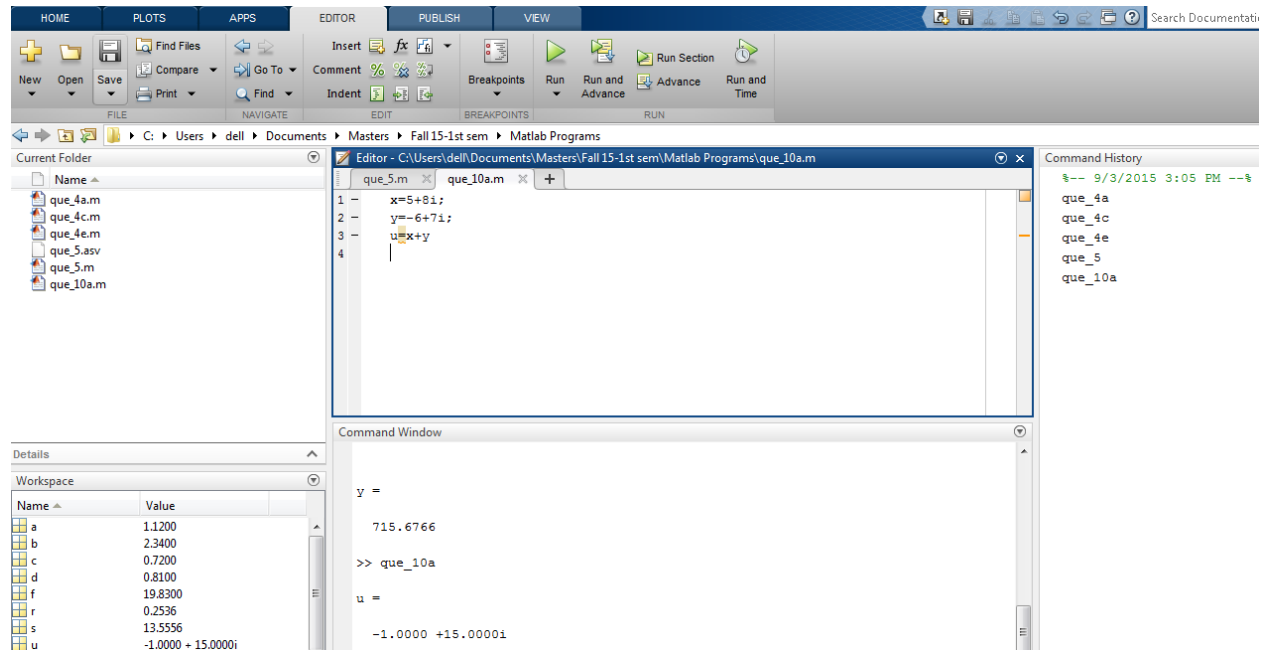
```
>> x=5+8i;
```

```
>> y=-6+7i;
```

```
>> u=x+y
```

```
u =
```

```
-1.0000 +15.0000i
```



10c.  $w=x/y$

**Solution:**

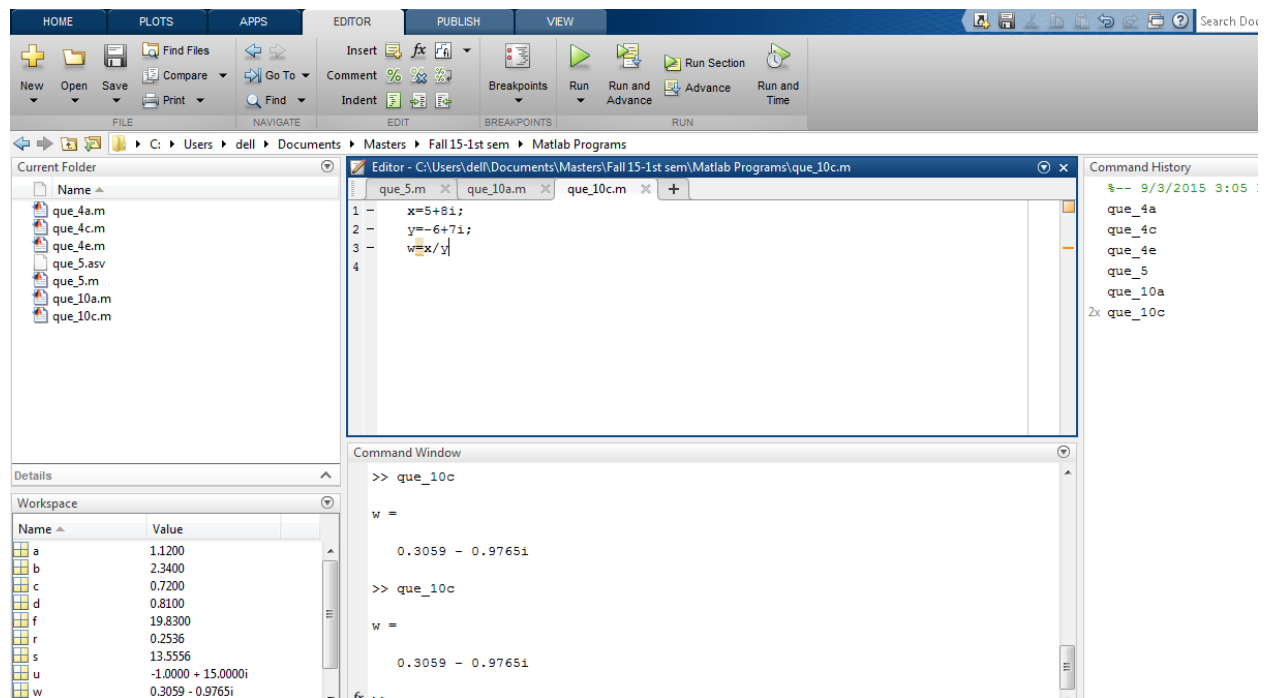
```
>> x=5+8i;
```

```
>> y=-6+7i;
```

```
>> w=x/y
```

```
w =
```

```
0.3059 - 0.9765i
```



10e.  $r=Vy$

**Solution:**

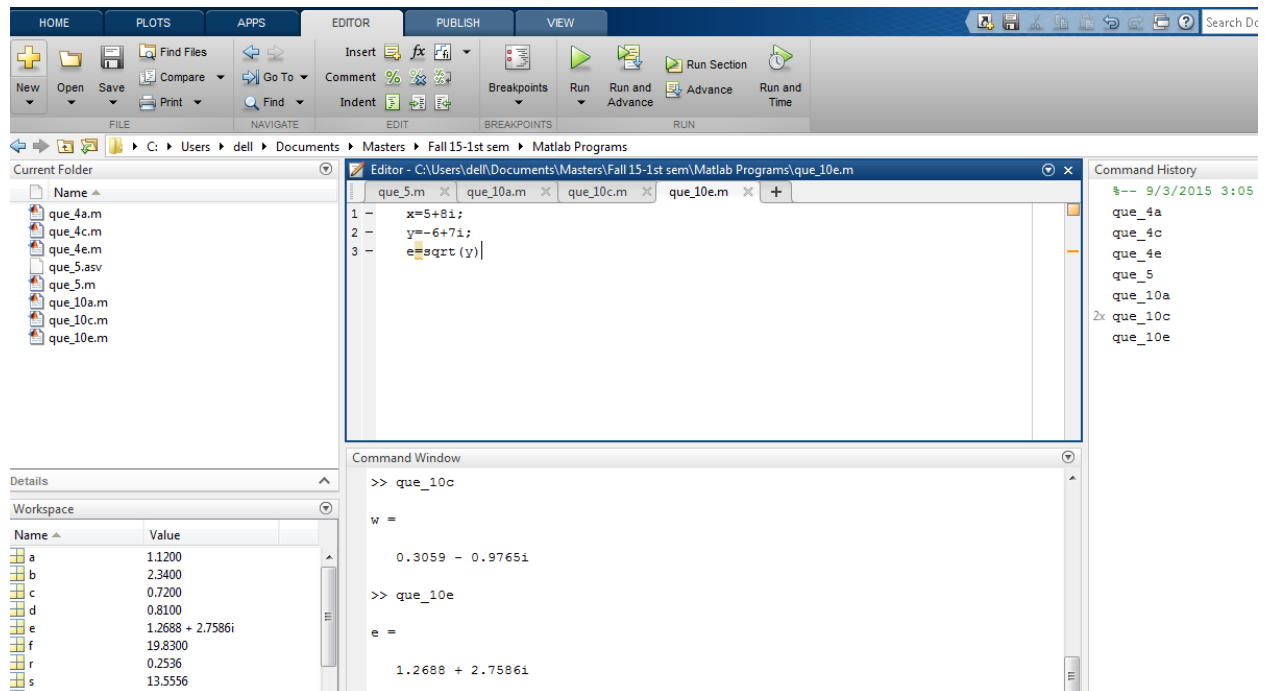
**>> x=5+8i;**

**>> y=-6+7i;**

**>> e=sqrt(y)**

**e =**

**1.2688 + 2.7586i**



4. Use MATLAB to calculate

$$15a. e^{(-2.1)^3} + 3.47 \log(14) + 287^{1/4}$$

**Solution:**

```
>> a=exp(-2.1)^3+3.47*log10(14)+287^(1/4)
```

**a =**

**8.0949**

The MATLAB Editor window displays the script 'que\_15a.m' with the following code:

```
1 - a = exp(-2.1)^3 + 3.47*log10(14) + 287^(1/4)
```

The Command Window shows the execution of the script:

```
>> que_10e
e =
    1.2688 + 2.7586i

>> que_15a
a =
    8.0949
```

The Command History window shows the following commands:

```
que_4a
que_4c
que_4e
que_5
que_10a
2x que_10c
que_10e
que_15a
```

The Workspace window shows the following variables:

Name	Value
a	8.0949
b	2.3400
c	0.7200
d	0.8100
e	1.2688 + 2.7586i
f	19.8300
r	0.2536
s	13.5556

15c.  $\cos^2(4.12\pi/6)$

**Solution:**

**>> a=(cos((4.12\*pi)/6))^2**

**a = 0.3062**

The MATLAB Editor window displays the script 'que\_15c.m' with the following code:

```
1 - a = (cos((4.12*pi)/6))^2
```

The Command Window shows the execution of the script:

```
>> que_15a
a =
    8.0949

>> que_15c
a =
    0.3062
```

The Command History window shows the following commands:

```
que_4a
que_4c
que_4e
que_5
que_10a
2x que_10c
que_10e
que_15a
que_15c
```

The Workspace window shows the following variables:

Name	Value
a	0.3062
b	2.3400
c	0.7200
d	0.8100
e	1.2688 + 2.7586i
f	19.8300
r	0.2536
s	13.5556



$$15d.\cos(4.12\pi/6)^2$$

**Solution:**

```
>> x=(4.12*pi)/6
```

**x =**

**2.1572**

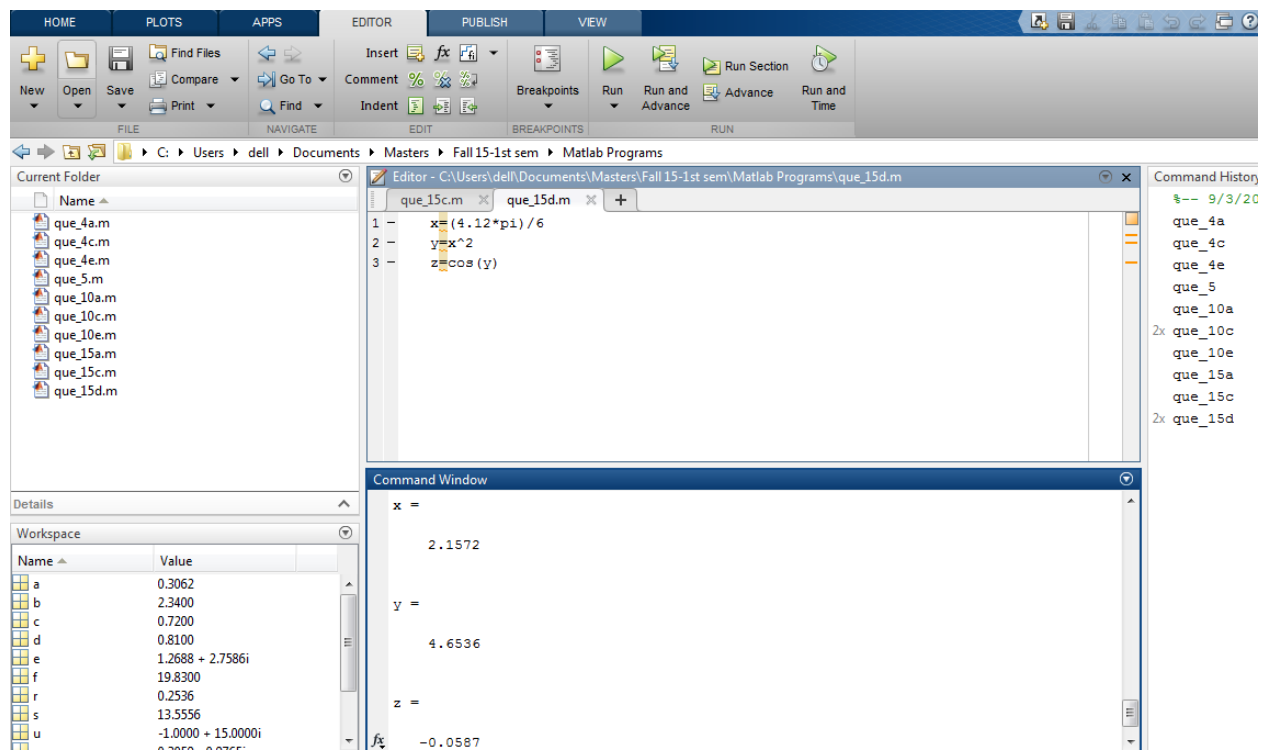
```
>> y=x^2
```

**y =**

**4.6536**

```
>> z=cos(y)
```

**z = -0.0587**



5. Use MATLAB to find roots of

$$18. 13x^3+182x^2-184x+2503=0$$

**SOLUTION:**

```
>> a=[13, 182, -184, 2503];
```

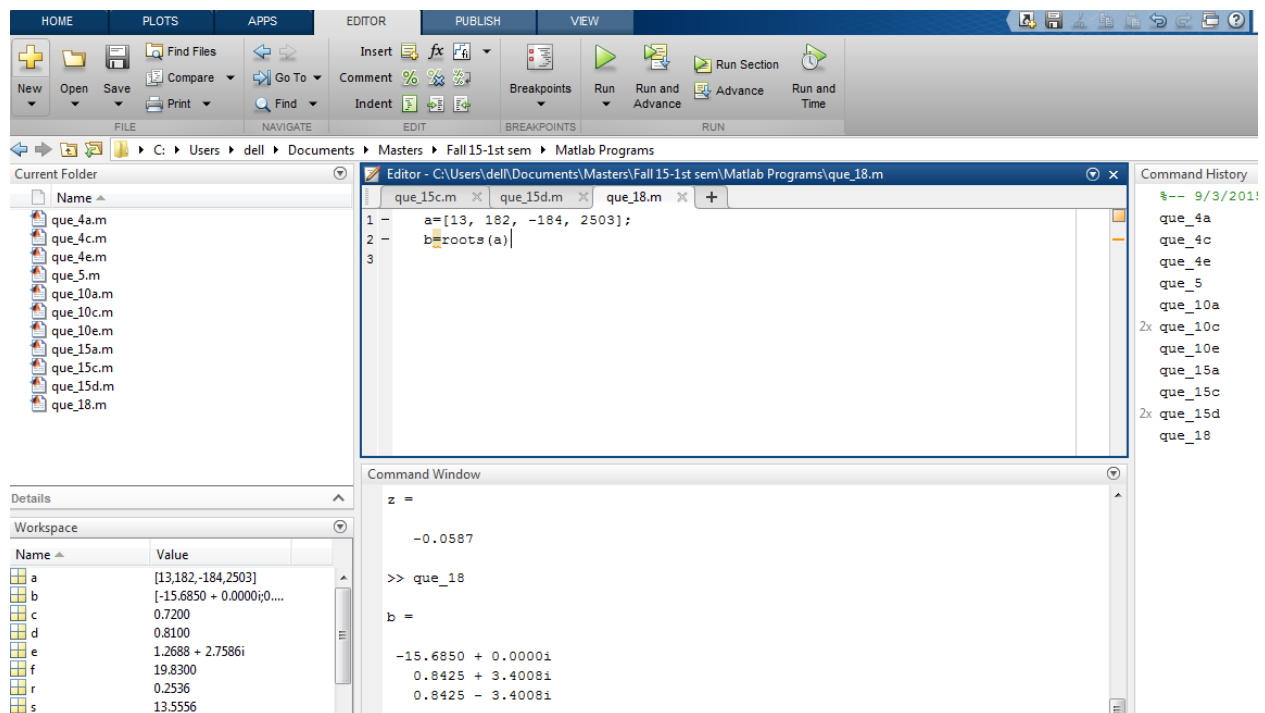
```
>> b=roots(a)
```

**b =**

**-15.6850 + 0.0000i**

**0.8425 + 3.4008i**

**0.8425 - 3.4008i**



6. Use MATLAB to plot function

21.  $T=6 \ln t - 7e^{0.2t}$ , interval  $1 \leq t \leq 3$

**Solution:**

```
>> t=1:0.2:3;
```

```
>> T=6*log(t)-7*exp(0.2*t)
```

**T =**

**Columns 1 through 8**

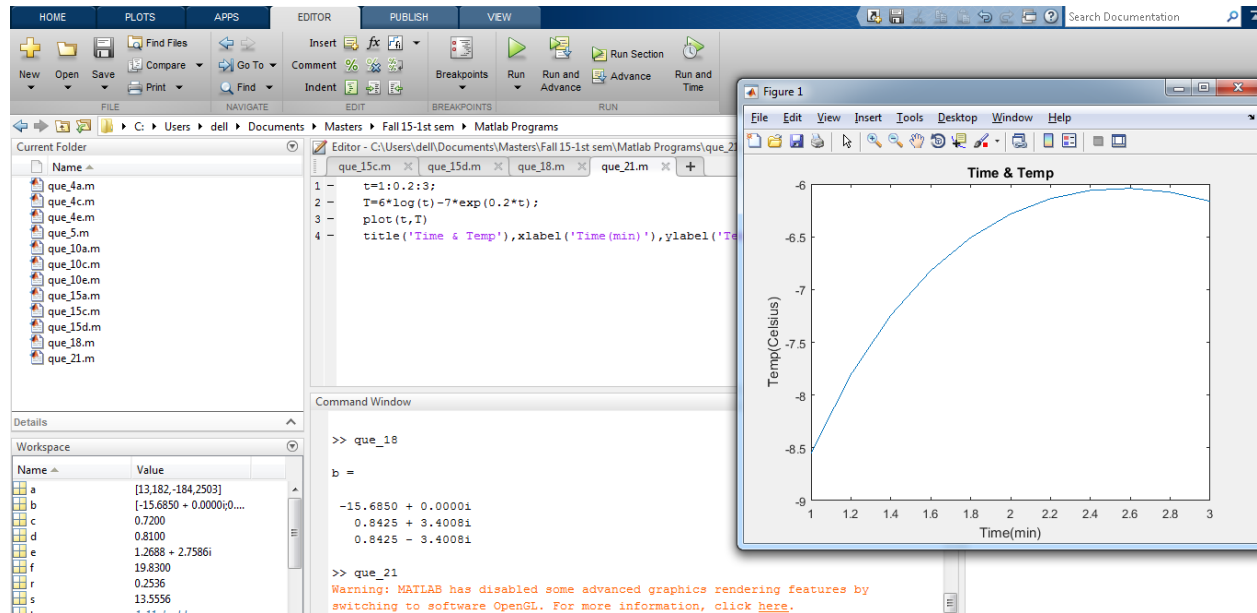
-8.5498 -7.8048 -7.2431 -6.8199 -6.5066 -6.2839 -6.1382 -6.0597

Columns 9 through 11

-6.0411 -6.0770 -6.1632

```
>> plot(t,T)
```

```
>> title('Time & Temp'),xlabel('Time(min)'),ylabel('Temp(Celsius)')
```



## 7. Fourier Series Representation

$$23. f(x) = \begin{cases} 1, & 0 < x < \pi \end{cases}$$

$$\begin{cases} -1, & -\pi < x < 0 \end{cases}$$

$$4/\pi(\sin x + \sin 3x/3 + \sin 5x/5 + \sin 7x/7)$$

**Solution:**

$$x = -\pi:0.1:\pi;$$

$$x1 = [0, \pi];$$

$$x2 = [-\pi, 0];$$

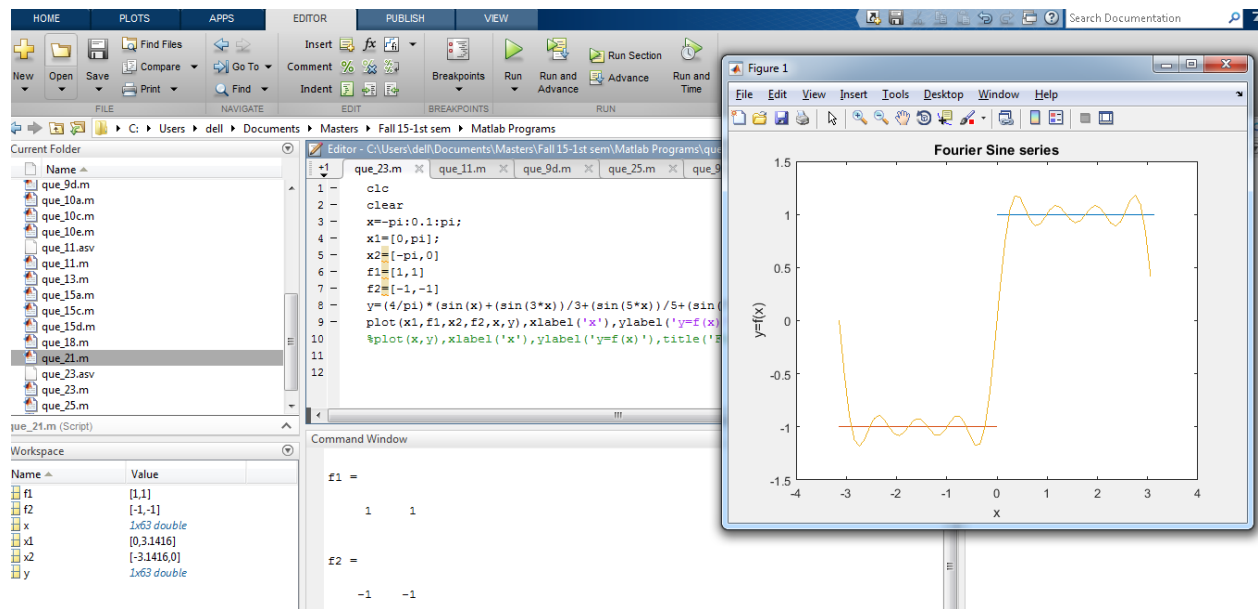
$$f1 = [1, 1];$$

$$f2 = [-1, -1];$$

$$y = (4/\pi) * (\sin(x) + (\sin(3*x))/3 + (\sin(5*x))/5 + (\sin(7*x))/7);$$

$$\text{plot}(x1, f1, x2, f2, x, y), \text{xlabel}('x'), \text{ylabel}('y=f(x)'), \text{title}('Fourier Sine series')$$

$$\% \text{plot}(x, y), \text{xlabel}('x'), \text{ylabel}('y=f(x)'), \text{title}('Fourier Sine series')$$



8.

25. Find the Length 'L' and total length of fence.  $W=6m$  and  $A=80m^2$ .

**Solution:**

**$W=6$ ;**

**$A=80$ ;**

**% By pythagoras theorem,  $W^2=D^2+D^2$ ;**

**$D=\sqrt{W^2/2}$  %Side of right triangle**

**%Total area=Area of Rectangle+Area of Right angle Triangle**

**$\%A=(L*W)+((1/2)*D^2)$**

**Length=( $A-(D^2/2)$ )/6 %length of rectangle**

**%Total length of fence= $L+L+W+D+D$**

**TotalLength= $L+L+W+D+D$**

**disp('Total length of fence is ')**

**disp>TotalLength)**

**D =**

**4.2426**

**Length =**

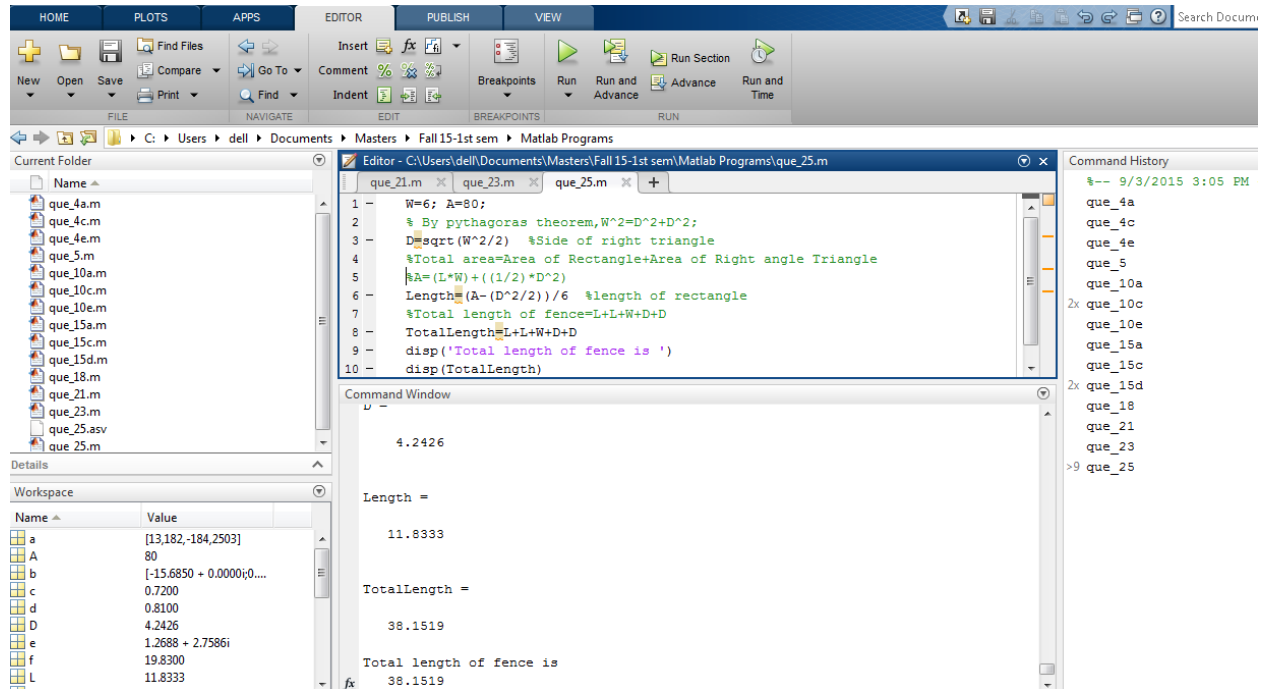
**11.8333**

**TotalLength =**

**38.1519**

**Total length of fence is**

**38.1519**



## Chapter-2:

6a.4 by 3 array consisting of elements from second through fourth column

**Solution:**

**A=[3,7,-4,12;-5,9,10,2;6,13,8,11;15,5,4,1]**

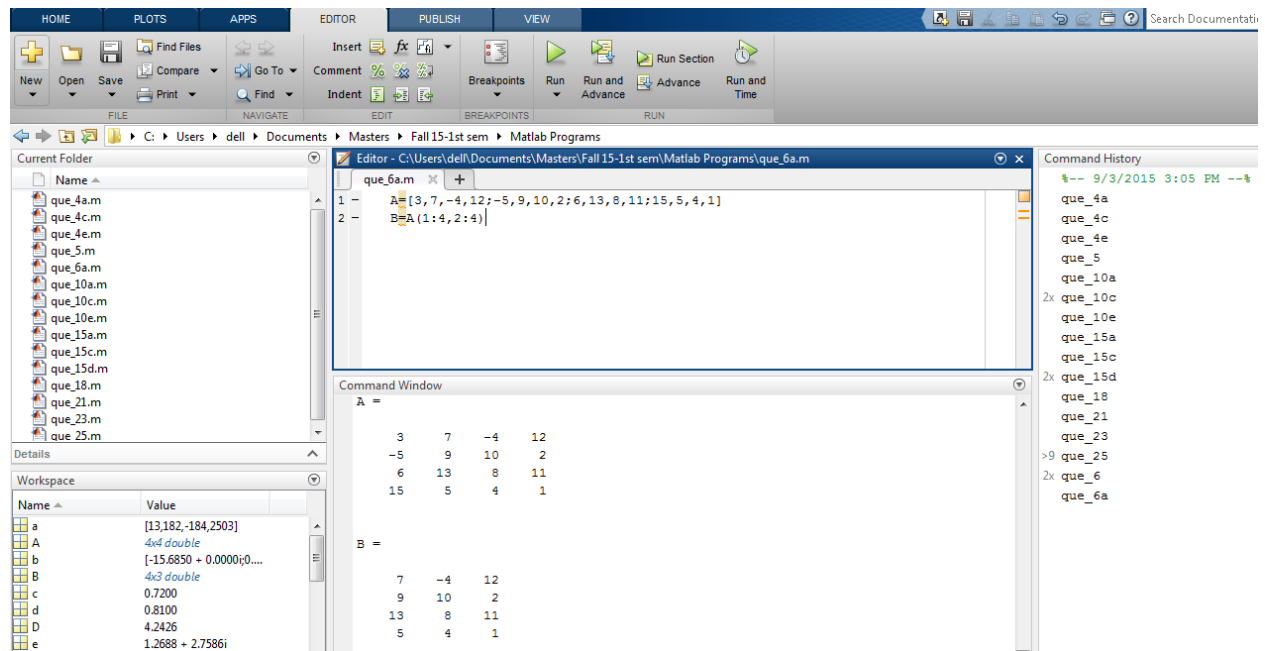
**B=A(1:4,2:4)**

**A =**

```
3   7  -4  12
-5   9  10   2
6  13   8  11
15   5   4   1
```

**B =**

```
7  -4  12
9  10   2
13  8  11
5   4   1
```



6b.3 by 4 array consisting of elements from second through fourth rows

**Solution:**

**A=[3,7,-4,12;-5,9,10,2;6,13,8,11;15,5,4,1]**

**C=A(2:4,1:4)**

**A =**

**3   7   -4   12**

**-5   9   10   2**

**6   13   8   11**

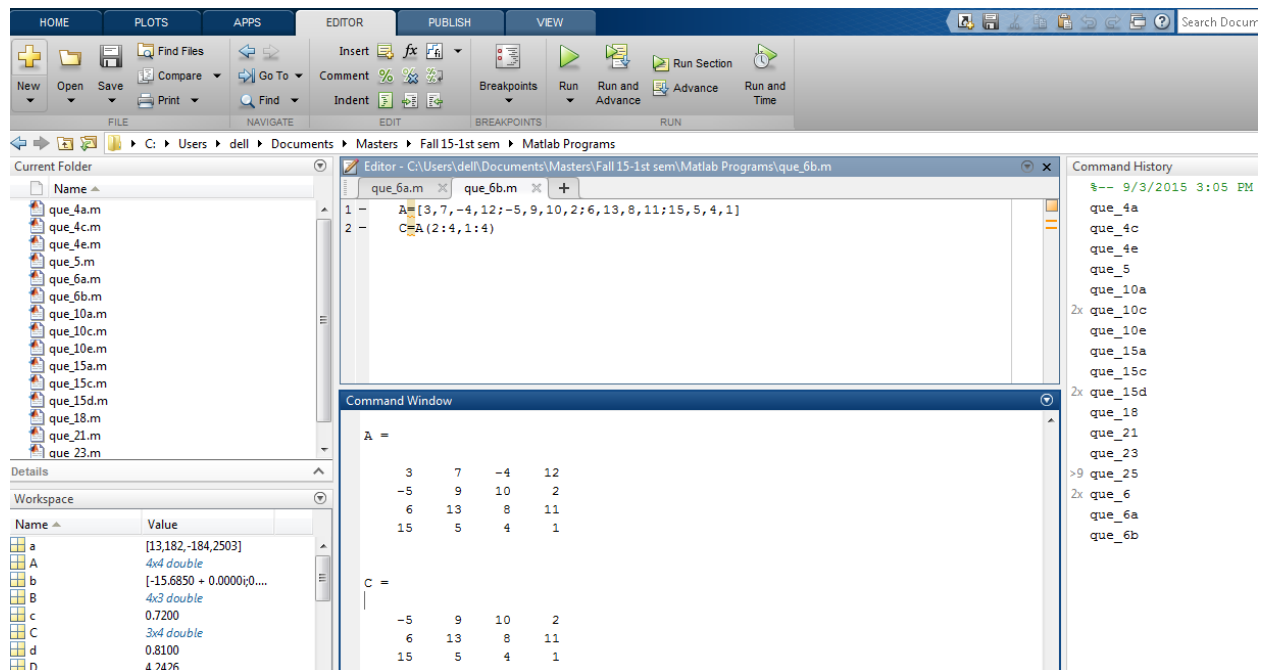
**15   5   4   1**

**C =**

**-5   9   10   2**

**6   13   8   11**

**15   5   4   1**



6c. 2 by 3 array consisting of elements from first two rows and last three columns

**Solution:**

**A=[3,7,-4,12;-5,9,10,2;6,13,8,11;15,5,4,1]**

**D=A(1:2,2:4)**

**A =**

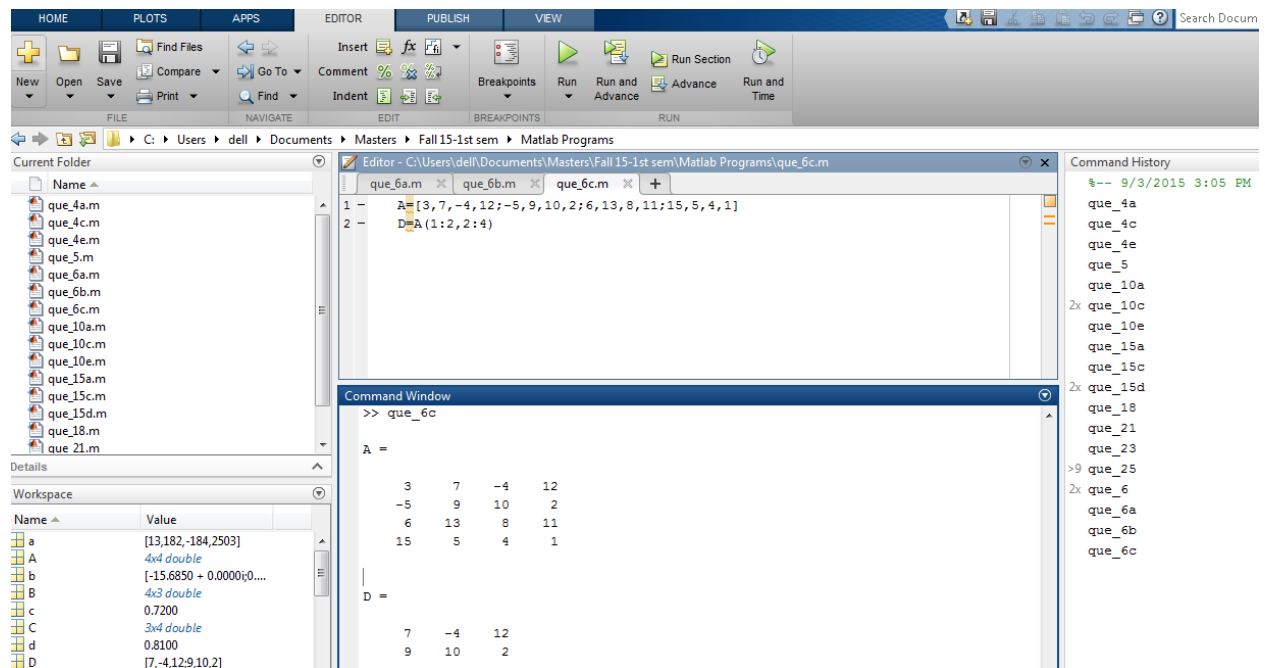
```

3   7  -4  12
-5  9  10   2
6  13   8  11
15  5   4   1
```

**D =**

```

7  -4  12
9  10   2
```



9a. Sort each columns of A and store it in B

**Solution:**

**A=[3,7,-4,12;-5,9,10,2;6,13,8,11;15,5,4,1]**

**B=sort(A)**

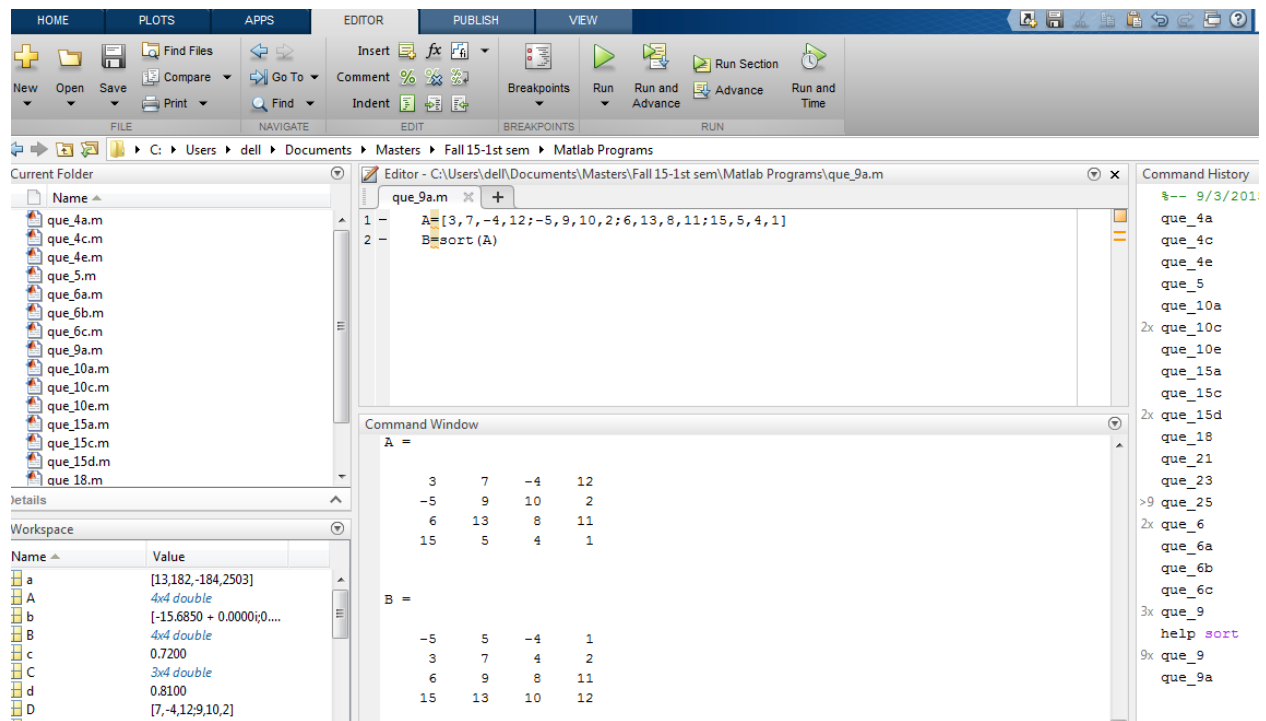
**A =**

```
3   7  -4  12
-5   9  10   2
6  13   8  11
15   5   4   1
```

**B =**

```
-5   5  -4   1
3   7   4   2
6   9   8  11
15  13  10  12
```





9b. Sort each row of A and store it in C

**Solution:**

**A=[3,7,-4,12;-5,9,10,2;6,13,8,11;15,5,4,1]**

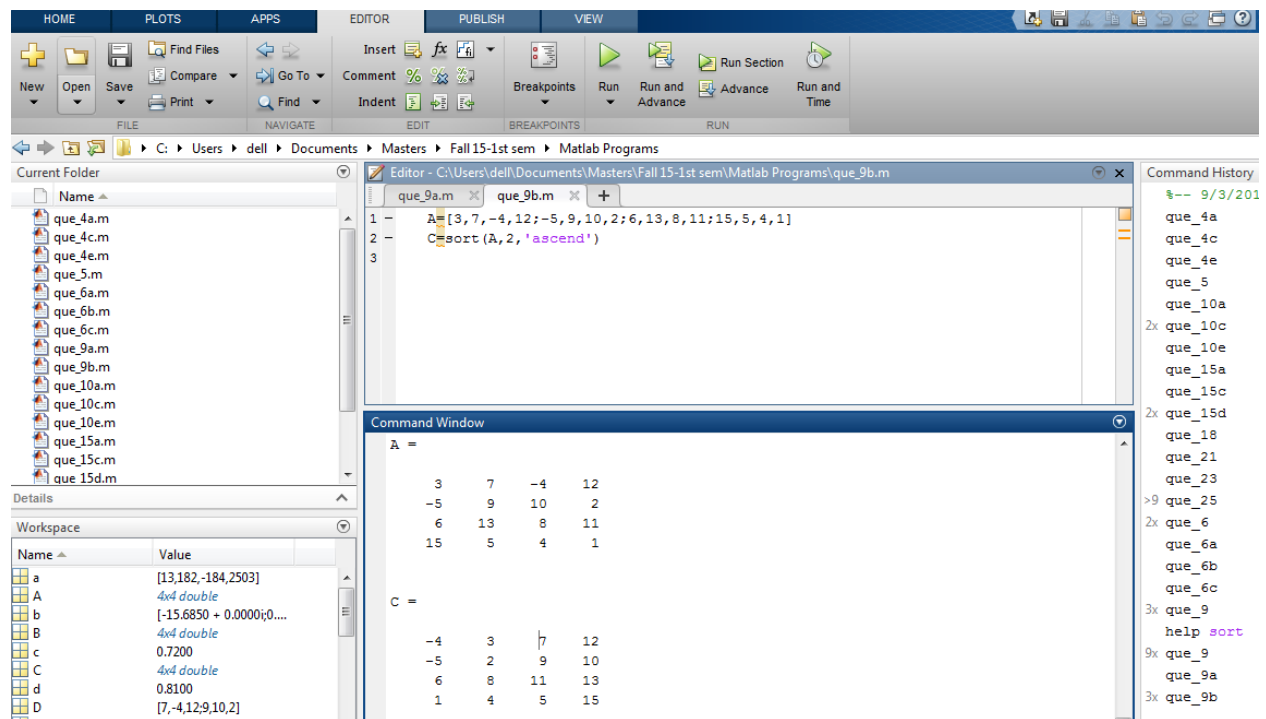
**C=sort(A,2,'ascend')**

**A =**

```
3     7    -4    12
-5     9    10     2
 6    13     8    11
15     5     4     1
```

**C =**

```
-4     3     7    12
-5     2     9    10
 6     8    11    13
 1     4     5    15
```



9c. Add each column and store it in D

**Solution:**

**A=[3,7,-4,12;-5,9,10,2;6,13,8,11;15,5,4,1]**

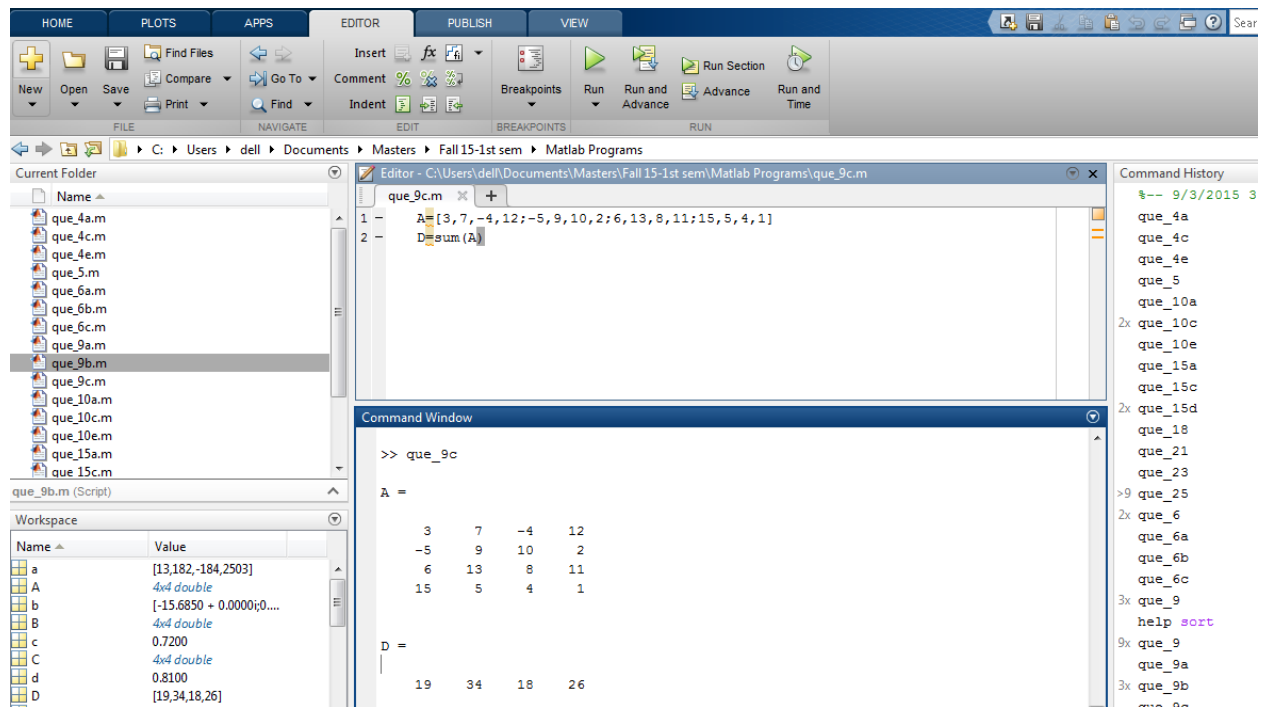
**D=sum(A)**

**A =**

```
3   7  -4  12
-5   9  10   2
 6  13   8  11
15   5   4   1
```

**D =**

```
19  34  18  26
```



9d. Add each row and store it in E

**Solution:**

**A=[3,7,-4,12;-5,9,10,2;6,13,8,11;15,5,4,1]**

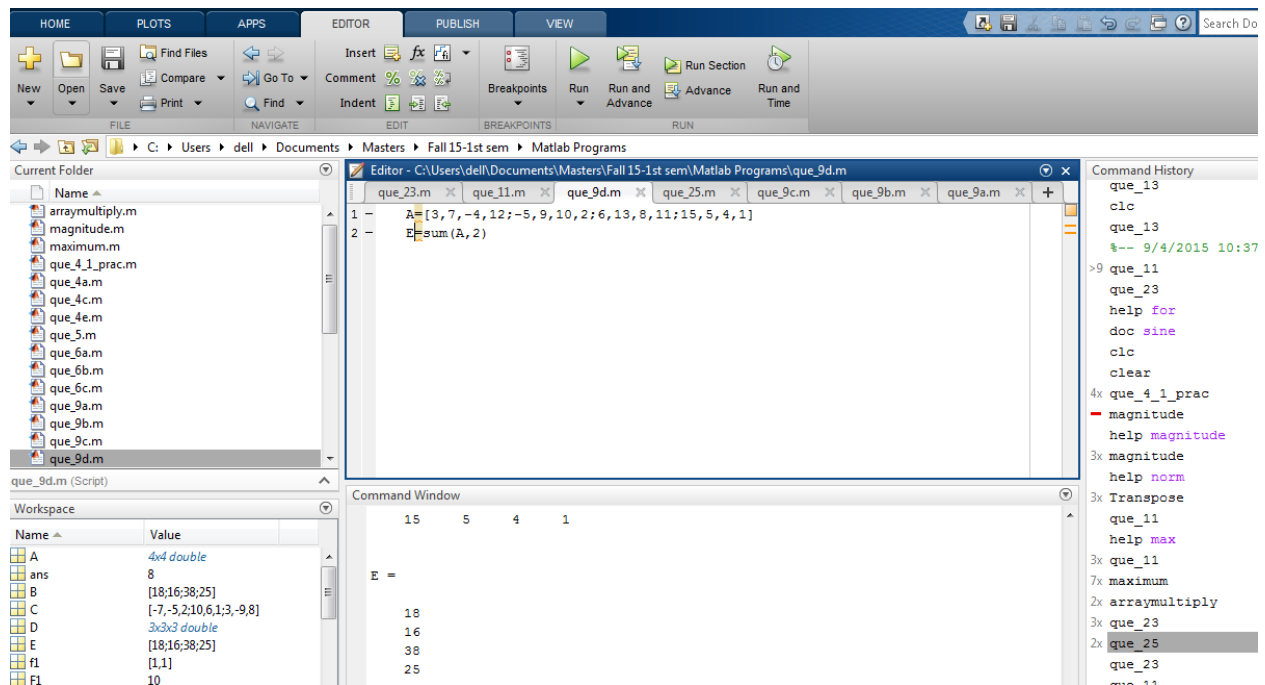
**B=sum(A,2)**

**A =**

```
3  7  -4  12
-5  9  10  2
6  13  8  11
15  5  4  1
```

**E =**

```
18
16
38
25
```



## 11. Create 3-D array D

**Solution:**

**A=[3,-2,1;6,8,-5;7,9,10]**

**B=[6,9,-4;7,5,3;-8,2,1]**

**C=[-7,-5,2;10,6,1;3,-9,8]**

**D=cat(3,A,B,C)**

**F1=max(A(:)),disp('largest element in first layer'),disp(F1)**

**F2=max(B(:)),disp('largest element in second layer'),disp(F2)**

**F3=max(C(:)),disp('largest element in third layer'),disp(F3)**

**E=max(D(:)),disp('largest element in D'),disp(E)**

**D(:,1) =**

```

3  -2   1
6   8  -5
7   9  10

```

**D(:,2) =**

```

6   9  -4
7   5   3
-8   2   1

```

**D(:, :, 3) =**

<b>-7</b>	<b>-5</b>	<b>2</b>
<b>10</b>	<b>6</b>	<b>1</b>
<b>3</b>	<b>-9</b>	<b>8</b>

**F1 = 10**

**largest element in first layer**  
**10**

**F2 = 9**

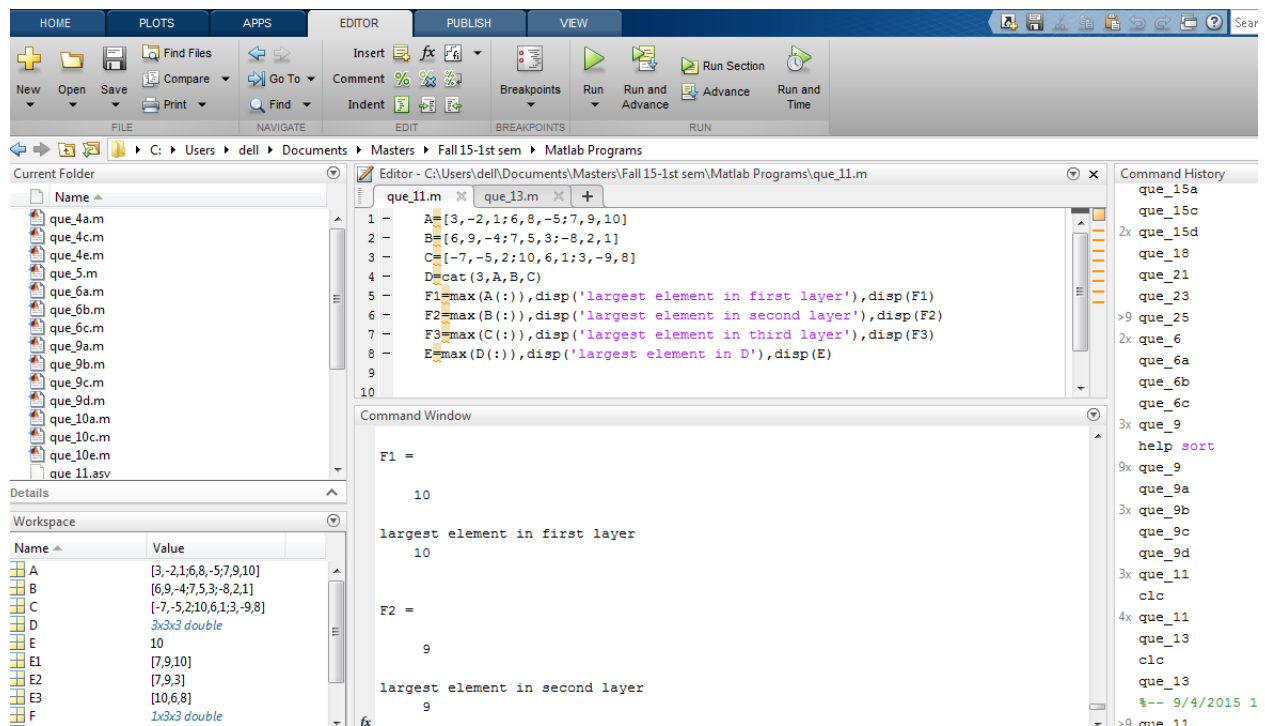
**largest element in second layer**  
**9**

**F3 = 10**

**largest element in third layer**  
**10**

**E = 10**

**largest element in D**  
**10**



## 12. Array product, right division and power

**Solution:**

**A=[56,32;24,-16]**

**B=[14,-4;6,-2]**

**C=A.\*B**

**D=A./B**

**E=B.^3**

**A =**

```

56  32
24 -16

```

**B =**

```

14  -4
 6  -2

```

**C =**

```

784 -128

```

144 32

D =

4 -8  
4 8

E =

2744 -64  
216 -8

The image shows the MATLAB R2016a interface. The top toolbar includes tabs for HOME, PLOTS, APPS, EDITOR, PUBLISH, and VIEW. The EDITOR tab is active, showing a script named 'que\_13.m' with the following code:

```
1 A=[56,32;24,-16]
2 B=[14,-4;6,-2]
3 C=A.*B
4 D=A./B
5 E=B.^3
```

The Command Window displays the results of the script execution:

```
6 -2
C =
784 -128
144 32
D =
4 -8
4 8
E =
2744 -64
216 -8
```

The Workspace window shows the following variables and their values:

Name	Value
a	[13,182,-184,2503]
A	[56,32;24,-16]
b	[-15.6850 + 0.0000i;0....]
B	[14,-4;6,-2]
c	0.7200
C	[784,-128;144,32]
d	0.8100
D	[4,-8;4,8]
e	1.2688 + 2.7586i

The Command History window on the right shows a list of commands executed, including 'que\_10c', 'que\_10e', 'que\_15a', 'que\_15c', 'que\_15d', 'que\_18', 'que\_21', 'que\_23', 'que\_25', 'que\_6', 'que\_6a', 'que\_6b', 'que\_6c', 'que\_9', 'help sort', 'que\_9', 'que\_9a', 'que\_9b', 'que\_9c', 'que\_9d', 'que\_11', 'clc', 'que\_11', 'que\_13', 'clc', and 'que\_11'.