

```
% Assignment 5
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% IDE:- MATLAB
```

## Question A

Solve the following quadratic equation in MATLAB and display their roots. Note: If roots are fractions then show their nearby rational number.

1

$$x^2 - 7x + 12 = 0$$

```
clc;
close all;
clear all;

syms x;
a = solve(x^2 - 7*x + 12 == 0,x);
disp(vpa(a));
```

3.0  
4.0

2

$$(x-3)^2(x-7)=0$$

```
clc;
close all;
clear all;

syms x;
a = solve((x-3)^2*(x-7)==0,x);
disp(vpa(a));
```

3.0  
3.0  
7.0

3

$$x^4 - 7x^3 + 3x^2 - 5x + 9 = 0$$

```
clc;
close all;
clear all;

syms x;
a = solve(x^4 - 7*x^3 + 3*x^2 - 5*x + 9 ==0);
disp(vpa(a));
```

```

1.0597804633025896291682772499885
- 0.34508839784665403032666523448675 - 1.0778362954630176596831109269793i
- 0.34508839784665403032666523448675 + 1.0778362954630176596831109269793i
6.630396332390718431485053218985

```

#### 4

$$6x^2 - 11x - 35 = 0$$

```

clc;
close all;
clear all;

syms x;
a = solve(6*x^2 - 11*x - 35 == 0);
disp(vpa(a));

```

```

-1.6666666666666666666666666666667
3.5

```

#### 5

$$(x-2)^2 - 12 = 0$$

```

clc;
close all;
clear all;

syms x;
a = solve((x-2)^2 - 12 == 0);
disp(vpa(a));

```

```

-1.4641016151377545870548926830117
5.4641016151377545870548926830117

```

#### 6

$$6x^5 - 41x^4 + 97x^3 - 97x^2 + 41x - 6 = 0$$

```

clc;
close all;
clear all;

syms x;
a = solve(6*x^5 - 41*x^4 + 97*x^3 - 97*x^2 + 41*x - 6 == 0);
disp(vpa(a));

```

```

0.33333333333333333333333333333333
0.5
1.0
2.0

```

3.0

## 7

Find the values of x, y, z of the equation:-  $x+y+z = 3$   $x+2*y*3*z = 4$   $x+4*y+9*y = 6$

```
clc;
close all;
clear all;

syms x y z;
[solx soly solz] = solve([x+y+z==3,x+2*y*3*z==4,x+4*y+9*y==6]);
fprintf("X:-\n");
disp(vpa(solx));
fprintf("Y:-\n");
disp(vpa(soly));
fprintf("Z:-\n");
disp(vpa(solz));
```

X:-  
4.97276680079535822979748645319  
1.4300109769824195479802913245878

Y:-  
0.07901793840035705924634719590846  
0.3515376171551984963092083596471

Z:-  
-2.0517847391957152890438336490985  
1.2184514058623819557105003157651

## 8

For  $F(x) = 8*x^8 - 7*x^7 + 12*x^6 - 5*x^5 + 8*x^4 + 13*x^3 - 12*x + 9$ , compute  $F(2)$  and roots of  $F(x)$  and plot for (0,20).

```
clc;
close all;
clear all;

syms x;
eqn = 8*x^8 - 7*x^7 + 12*x^6 - 5*x^5 + 8*x^4 + 13*x^3 - 12*x + 9;

roots = solve(eqn);
val = subs(eqn,2);

fprintf('Roots:-\n');
disp(vpa(roots));

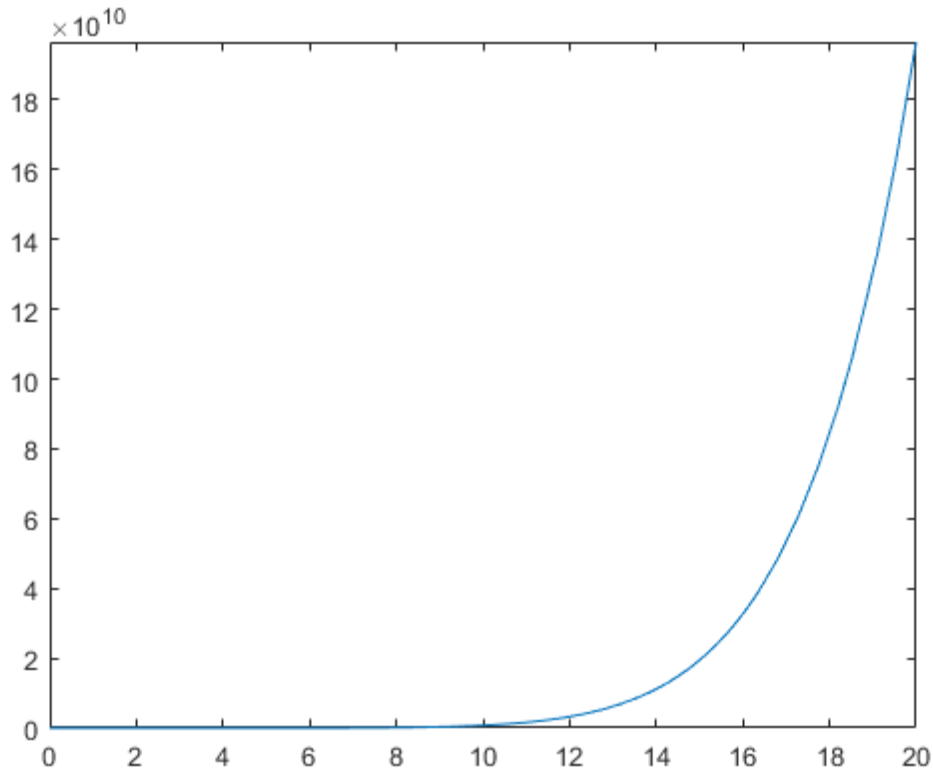
fprintf('F(2):-\n');
disp(val);

fplot(eqn,[0,20]);
```

Roots:-  
0.5629431810457050801227171992458 - 0.38279313076300248988975872492506i  
0.5629431810457050801227171992458 + 0.38279313076300248988975872492506i  
- 0.80533865896725904040171382285424 - 0.43059503755383282537779894668648i

```
- 0.80533865896725904040171382285424 + 0.43059503755383282537779894668648i
0.88782808678993946056356701254061 - 0.93184477532499893920075143671717i
0.88782808678993946056356701254061 + 0.93184477532499893920075143671717i
- 0.20793260886838550028457038893216 - 1.3091448390499472670844467948617i
- 0.20793260886838550028457038893216 + 1.3091448390499472670844467948617i
```

F(2):-  
1977



## Question B

Solve the following equations in MATLAB.

1

$$5x + 9y = 5 \quad 3x - 6y = 4$$

```
clc;
close all;
clear all;

syms x y ;
[solx soly] = solve([5*x+ 9*y == 5, 3*x - 6*y == 4]);
fprintf("X:-\n");
disp(vpa(solx));
fprintf("Y:-\n");
disp(vpa(soly));
```

X:-  
1.1578947368421052631578947368421

Y:-

-0.087719298245614035087719298245614

## 2

$$x+3y-2z = 5 \quad 3x+5z+6z = 7 \quad 2x+4y+3z = 8$$

```
clc;
close all;
clear all;

syms x y z;
[solx soly solz] = solve([x+3*y-2*z==5,3*x+5*z+6*z==7,2*x+4*y+3*z==8]);
fprintf("X:-\n");
disp(vpa(solx));
fprintf("Y:-\n");
disp(vpa(soly));
fprintf("Z:-\n");
disp(vpa(solz));
```

X:-  
2.5862068965517241379310344827586

Y:-  
0.75862068965517241379310344827586

Z:-  
-0.068965517241379310344827586206897

## 3

$$7x + 5y - 3z = 16 \quad 3x - 5y + 2z = 8 \quad 5x + 3y - 7z = 0$$

```
clc;
close all;
clear all;

syms x y z;
[solx soly solz] = solve([7*x + 5*y - 3*z == 16, 3*x - 5*y + 2*z == 8, 5*x + 3*y - 7*z==0]);
fprintf("X:-\n");
disp(vpa(solx));
fprintf("Y:-\n");
disp(vpa(soly));
fprintf("Z:-\n");
disp(vpa(solz));
```

X:-  
2.625

Y:-  
0.875

Z:-  
2.25

## 4

$$3x + 2y = 16 \quad 7x + y = 19$$

```
clc;
close all;
clear all;

syms x y;
[solx soly] = solve([3*x + 2*y == 16, 7*x + y == 19]);
fprintf("X:-\n");
disp(vpa(solx));
fprintf("Y:-\n");
disp(vpa(soly));
```

X:-  
2.0

Y:-  
5.0

## 5

$$4x + 3y = -2 \quad 8x - 2y = 12$$

```
clc;
close all;
clear all;

syms x y;
[solx soly] = solve([4*x + 3*y == -2, 8*x - 2*y == 12]);
fprintf("X:-\n");
disp(vpa(solx));
fprintf("Y:-\n");
disp(vpa(soly));
```

X:-  
1.0

Y:-  
-2.0

## Question C

Factorise and simplify the following Algebraic equation.

## 1

$$x^2 - y^2$$

```
clc;
close all;
clear all;

syms x y;
a = factor(x^2 - y^2);
disp(a);
```

$[x - y, x + y]$

## 2

---

$x^3 + y^3$

```
clc;
close all;
clear all;

syms x y;
a = factor(x^3 + y^3);
disp(a);
```

$[x + y, x^2 - x*y + y^2]$

## 3

---

$(x^4 - 16)/(x^2 - 4)$

```
clc;
close all;
clear all;

syms x;
a = factor((x^4 - 16)/(x^2 - 4));
disp(a);
```

$x^2 + 4$

## 4

---

$x^4 + y^4$

```
clc;
close all;
clear all;

syms x y;
a = factor(x^4 + y^4);
disp(a);
```

$x^4 + y^4$

## 5

---

$x^5 - y^5$

```
clc;
close all;
clear all;

syms x y;
a = factor(x^5 - y^5);
disp(a);
```

[ x - y, x^4 + x^3\*y + x^2\*y^2 + x\*y^3 + y^4]

## Question D

Find the limit of following functions.

1

```
clc;
close all;
clear all;

syms x;
a = limit((x^3 + 5)/(x^4 + 7) , x , 0);
disp(a);
```

5/7

2

```
clc;
close all;
clear all;

syms x;
a = limit((x - 3)/(x - 1) , x , 1);
disp(a);
```

NaN

3

```
clc;
close all;
clear all;

syms x;
a = limit((1 - x^0.5)/(1 - x) , x , 1);
disp(a);
```

1/2



**4**

```
clc;
close all;
clear all;

syms x;
a = limit((sin(5*x))/(3*x) , x , 0);
disp(a);
```

5/3

**Question E**

Show that the limit of given function does not exist using left and right hand sided limits and also plot graph for it.

**1**

```
clc;
close all;
clear all;

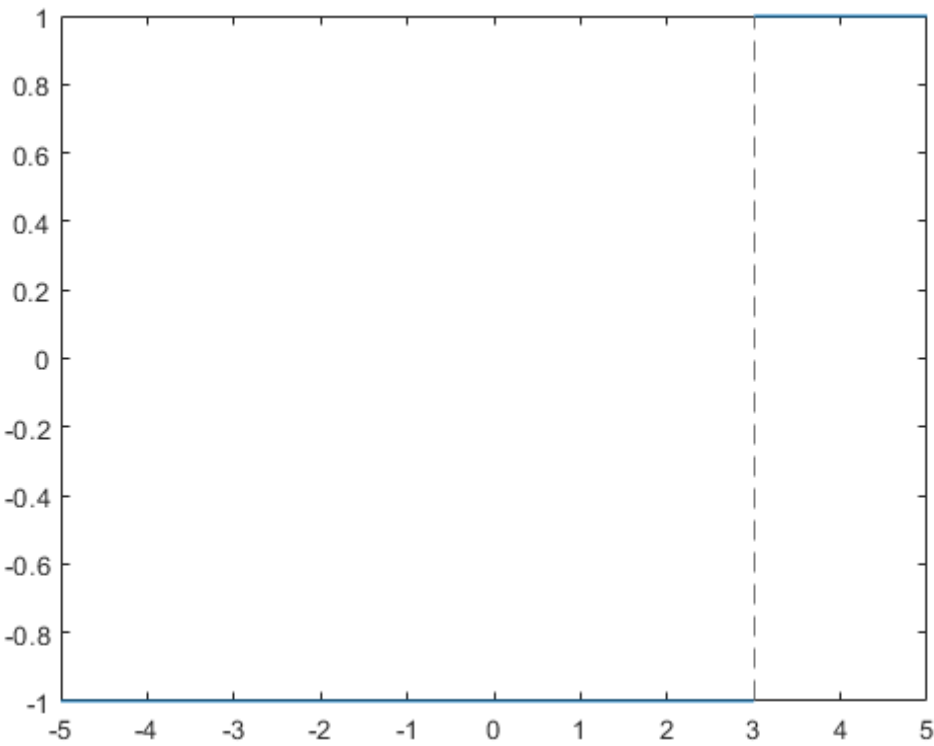
syms x;
eqn = (x-3)/abs(x-3);
left = limit(eqn,x,3,'left');
right = limit(eqn,x,3,'right');

fplot((x-3)/abs(x-3));

fprintf('LHL: ');
disp(left);
fprintf('RHL: ');
disp(right);
```

LHL: -1

RHL: 1



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