2. Plot the polynomial $y = -0.001x^4 + 0.051x^3 - 0.76x^2 + 3.8x - 1.4$ in the domain $1 \le x \le 14$.

Solution

```
p=[-0.001 0.051 -0.76 3.8 -1.4];
x=linspace(1,14,200);
y=polyval(p,x);
plot(x,y)
xlabel('x')
ylabel('y')
```

Use MATLAB to carry out the following multiplication of polynomials:

$$(x + 1.4)(x - 0.4)x(x + 0.6)(x - 1.4)$$

Plot the polynomial for $-1.5 \le x \le 1.5$.

Solution

```
p1=[1 1.4]; p2=[1 -0.4]; p3=[1 0.6]; p4=[1 -1.4];
p12=conv(p1,p2);
p34=conv(p3,p4);
p=conv(p12,p34)
x=linspace(-1.5,1.5,200);
y=polyval(p,x);
plot(x,y)
xlabel('x')
ylabel('y')
```

```
p =

    1.0000    0.2000   -2.2000   -0.3920    0.4704
```

Divide the polynomial $x^4 - 6x^3 + 13x^2 - 12x + 4$ by the polynomial $x^3 - 3x^2 + 2$.

Solution

```
u=[1 -6 13 -12 4];
v=[1 -3 2];
[q, r]=deconv(u,v)
```

```
q =
     1    -3     2
r =
     0     0     0     0     0
```

Q1/

Write a user-defined MATLAB function that determines the vector connecting two points (*A* and *B*) where (`V=B-A`) . For the function name `vector` . The input arguments to the function are vectors `A` and `B`, each with the Cartesian coordinates of points *A* and *B*. The output `V` is the vector from point *A* to point *B*. If points *A* and *B* have two coordinates each (they are in the *x y* plane), then `V` is a two-element vector. If points *A* and *B* have three coordinates each (general points in space), then `V` is a three-element vector. Use the function `vector` for determining the following vectors.
(*a*) The vector from point (0.5, 1.8) to point (–3, 16).
(*b*) The vector from point (–8.4, 3.5, –2.2) to point (5, –4.6, 15).

User-defined function:

```
function V=vector(A,B)
%Vector is function that determines the vector connecting two points (A and B)
%The input arguments to the function are vectors A and B
%The output V is the vector from point A to point B
V=B-A;
```

Command Window:

a)

```
>> A=[0.5 1.8];
>> B=[-3 16];
>> Va=vector(A,B)

Va =

   -3.5000   14.2000
```

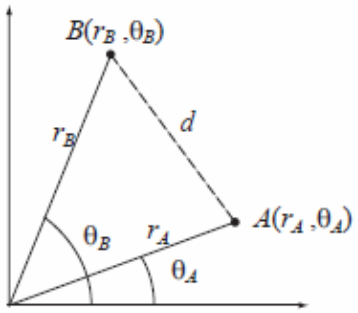
b)

```
>> A=[-8.4 3.5 -2.2];
>> B=[5 -4.6 15];
>> Vb=vector(A,B)

Vb =

   13.4000   -8.1000   17.2000
```

Q2/

Write a function that calculates the distance between two points $A\ (r_A, \theta_A)$ in a plane when the position of the points is given in polar coordinates.

$$d = \sqrt{r_A^2 + r_B^2 - 2r_A r_B \cos(\theta_A - \theta_B)}$$



a) Use the anonymous function between point $A\ (2, \pi/6)$ and point $B\ (5, 3\pi/4)$.

b) Use the inline function between point $A\ (2, \pi/6)$ and point $B\ (5, 3\pi/4)$.

c) Use A user-defined function (name it distance) between point $A\ (2, \pi/6)$ and point $B\ (5, 3\pi/4)$.

a) anonymous function

Command Window:

```
>> d= @ (rA,thetA,rB,thetB) sqrt(rA^2+rB^2-2*rA*rB*cos(thetB-thetA))

d =

    @(rA,thetA,rB,thetB)sqrt(rA^2+rB^2-2*rA*rB*cos(thetB-thetA))

>> a = d(2,pi/6,5,3*pi/4)

a =

    5.8461
```

b) inline function

Command Window:

```
>> d=inline('sqrt(rA^2+rB^2-2*rA*rB*cos(thetB-thetA))')

d =

     Inline function:
     d(rA,rB,thetA,thetB) = sqrt(rA^2+rB^2-2*rA*rB*cos(thetB-thetA))

>> d(2,5,pi/6,3*pi/4)

ans =

    5.8461
```

c)

User-defined function:

```
function d=distance(rA,thetA,rB,thetB)
%distance is function that determines the distance between two points in ...
%polar coordinates
%input arguments(rA,thetA,rB,thetB)polar coordinates point A(rA,thetA) and
%point B(rB,thetB)
% d is output argument
d=sqrt(rA^2+rB^2-2*rA*rB*cos(thetB-thetA))
```

Command Window:

```
>> distance(2,pi/6,5,3*pi/4)

d =

    5.8461
```