MATLAB
QUIZ 2
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Q1.

```
%define function
func = @(x) (x^3 - 4*(x^2))*sin(x);

%for points between -3 and 7
k = [-3:7];

%find and print all zeroes, near all [-3,-2,-1..... 6,7]
i =1;
range = 7-(-3);
while i <= range
    disp(fzero(func,k(i)))
    i = i+1;
end
```

the result is :

```
>> Q2Ques1
   -3.1416

   -3.1416

 -1.3129e-016

      0

  7.9652e-017

    3.1416

    3.1416

     4

     4

    6.2832
```

Q2.

```
function[val] = Q2Ques2(func,a,b,h)
%lab 2, Q1  x = [a,b] and no. of steps = h
syms x;
y=func;
if (a ==0)
    a =a+h
end
interval = (b-a)/(h-1);
X = [a:interval:b];
Y = subs(func,X);
L = zeros(length(X));
k =1;
while k <= h
   V=1;
   for j=1:h
      if k~=j
          V=conv(V,poly(X(j)))/(X(k)-X(j));
      end
   end
   L(k,:)=V;
   k = k+1;
end
C=Y*L;
disp(C)
hold on
k = [a:interval:b];
h(1) = plot(X,Y);
g = poly2sym(C)
Y2 = subs(g,k);
%h(2) = plot(C,Y,'--rs');
h(2) = plot(k,Y2,'--rs');
legend(h,'function','polynomial');
hold off
end
```

from the console, define the function as

```
syms x;
 t = exp(5*(sin(x)));
Q2Ques2(t,1,1.6,4);
```

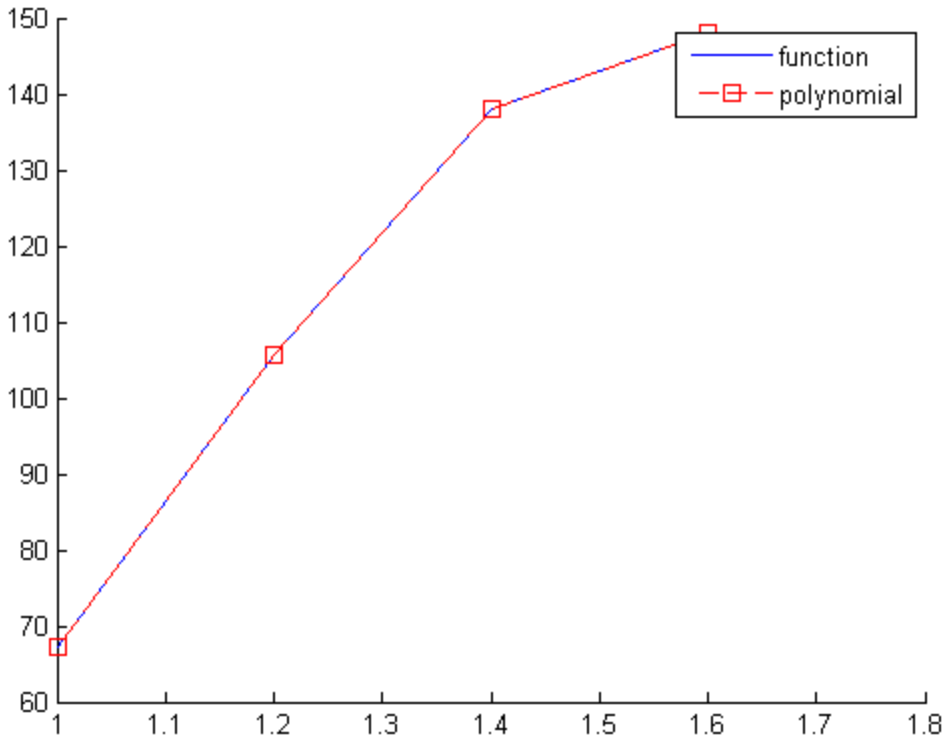
The polynomial coefficients are as :

```
C =

  1.0e+003 *

   -0.3356    1.1315   -1.0753    0.3466
```

And we get the plot as :


150
140
130
120
110
100
90
80
70
60
1
1.1
1.2
1.3
1.4
1.5
1.6
1.7
1.8
function
polynomial

Q3.
We can directly use the polyfit function.

```
x = [2.3 3.2 6.5 1.8 5.3 4.8 4.1 3.6 6.1 2.2]
y = [5.8 6.2 14.2 5 10.4 10.1 9.2 8.2 11.3 5]
k = polyfit(x,y,1)
```

and we get output as :

```
k =

    1.7968    1.3709
```

Q4.
Define

syms x;
f =sin(2*cos(3*x) + 1) + (x + 1)^3/pi^3;

and the function as :

```
function[val] = Q2Ques4(func,a,b,p)
syms x;
%take approximations around 'x', for N=5, we have to take 4 points around
%'x'

fl1=subs(func,(x-2));
fl2=subs(func,(x-1));
fr2=subs(func,(x+1));
fr1=subs(func,(x+2));

f = (fl1 - 8*fl2 + 8*fr2 - fr1) / 12;

%plot the function
k =[a:b];
g =subs(f,k)
plot(k,g)

%the value at x =0
cent_diff = subs(f,p)
end
```

so,

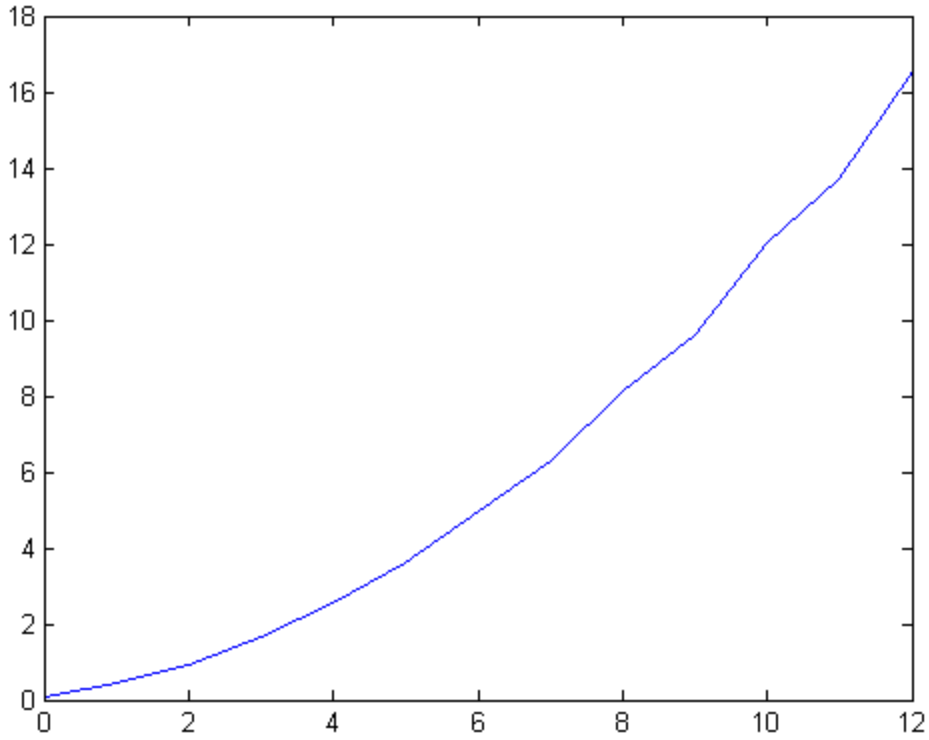
Q2Ques4(f,0,4*pi,0)

gives the result as :

```
cent_diff =

    0.0968
```

And plot as


18
16
14
12
10
8
6
4
2
0
0
2
4
6
8
10
12

Q5.

```
>> f2 = 1/(1+x)^(1/2);
>> int(f2,0,3)

ans =

2
```

Q6.

```
>> f3 = 1/(x^2 + 2*x +1);
>> int(f3,1,inf)

ans =

1/2
```