Problem2:

Solution:

The code for the a and b is :

Function code:

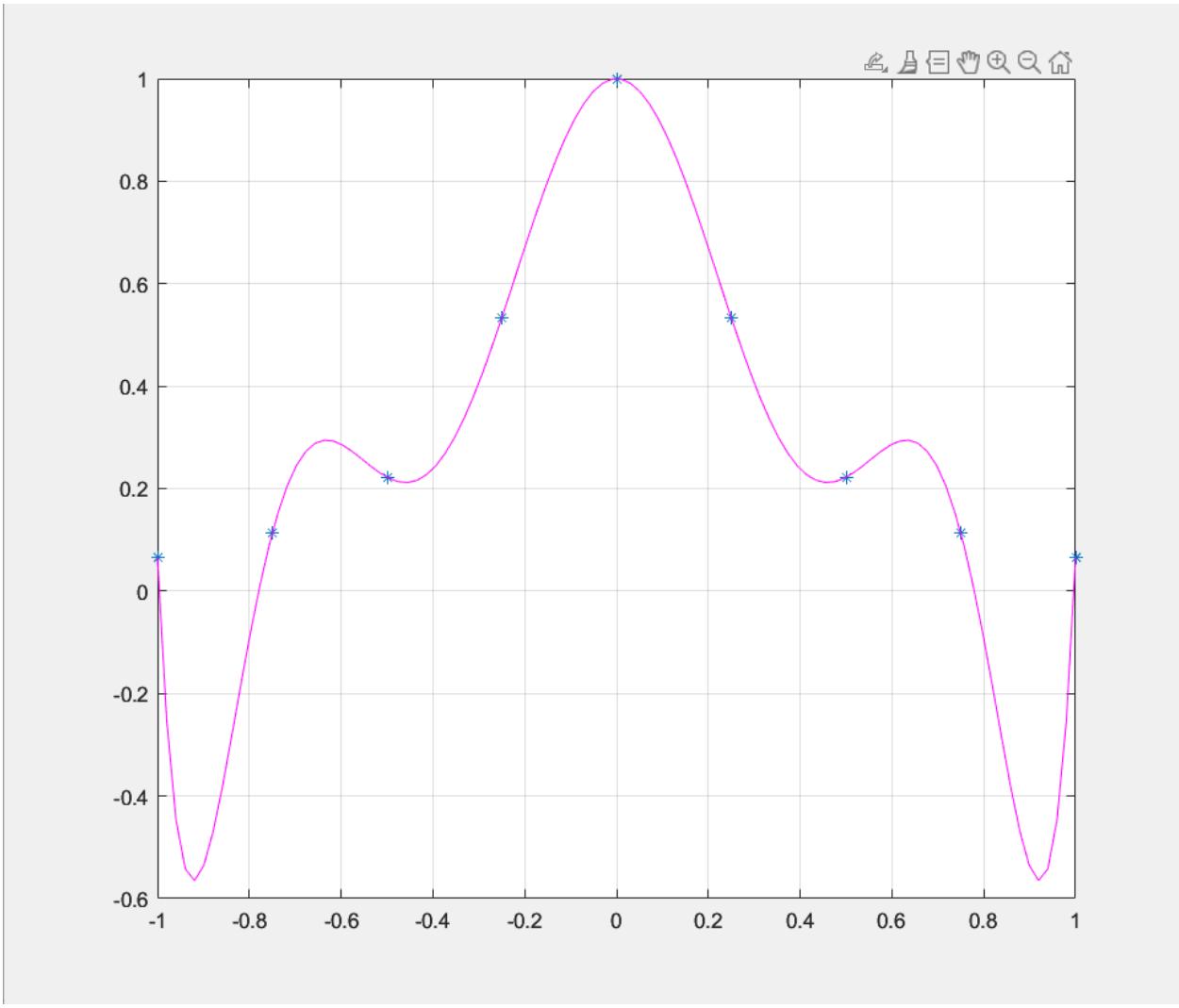
```
function [yPlot] = largInterpo(xData,yData, xPlot)

N = length(xData);
yP = 0;
for i = 1: N
    Li =1 ;
    for j = 1 : N
        if i ~=j
            Li = (Li).*((xPlot- xData(j))/(xData(i)- xData(j)));
        end
    end
    yP = yP+((Li)*yData(i));
end
yPlot = yP;
end
```

Script code:

```
clear all;
xData = linspace(-1,1,9);
yData = 1./(1+14*xData.^2);
xPlot = linspace(-1,1,100);
yPlot = largInterpo(xData, yData, xPlot);
%plot(xPlot, yPlot, 'm', xData, yData, "*"  );
plot( xData, yData, "*" ,xPlot, yPlot, 'm');
grid on
```

Output Graph:



Again:

Solution for part c:

Here I have only made changes to the xData

Function file:

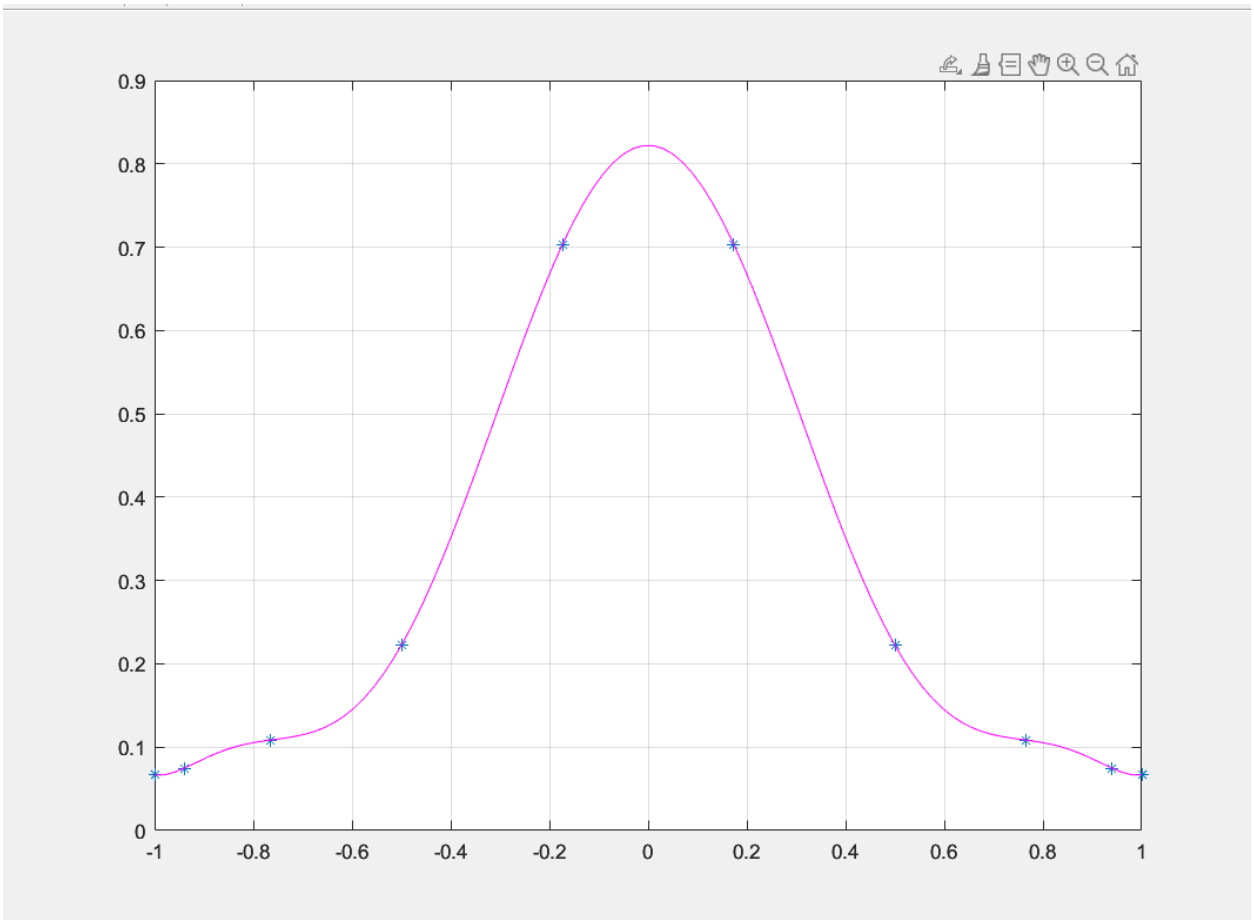
```
function [yPlot] = largInterpoChe(xData,yData, xPlot)

N = length(xData);
yP = 0;
for i = 1: N
    Li =1 ;
    for j = 1 : N
        if i ~=j
            Li = (Li).*((xPlot- xData(j))/(xData(i)- xData(j)));
        end
    end
    yP = yP+((Li)*yData(i));
end
yPlot = yP;
end
```

ScriptFile:

```
clear all;
%xData = linspace(-1,1,10)
n =9;
k = 0:n;
xData = -cos(pi*k./n);
yData = 1./(1+14*xData.^2);
xPlot = linspace(-1,1,100);
yPlot = largInterpo(xData, yData, xPlot);
%plot(xPlot, yPlot, 'm', xData, yData, "*"  );
plot( xData, yData, "*" ,xPlot, yPlot, 'm');
grid on
```

Output File:



Problem 5:

I have solved by hand to find the interpolating polynomials of degrees two, three and four.

Given,

$f(x) = 0.5x^3 - 2x^2 + 3x + 1$

$x = [-2, -1, 0, 1, 2]$

Creating the table

i	x_i	$f(x_i)$	IDD	IIDD	IIIrd DD	IV DD
0	-2	-17	12.5	-3.5	0.5	0.25
1	-1	-4.5	5.5	-2	0.5	
2	0	1	1.5	-0.5		
3	1	2.5	0.5			
4	2	3				

Hence,

2 degree interpolating polynomial is

$P_2(x) = -17 + 12.5(x+2) - 3.5(x+2)(x+1)$

3rd degree interpolating polynomial is

$P_3(x) = P_2(x) + 0.5(x+2)(x+1)(x)$

4th degree interpolating polynomial is

$P_4(x) = P_3(x) + 0.25(x+2)(x+1)(x)(x-1)$

My code for this problem is :

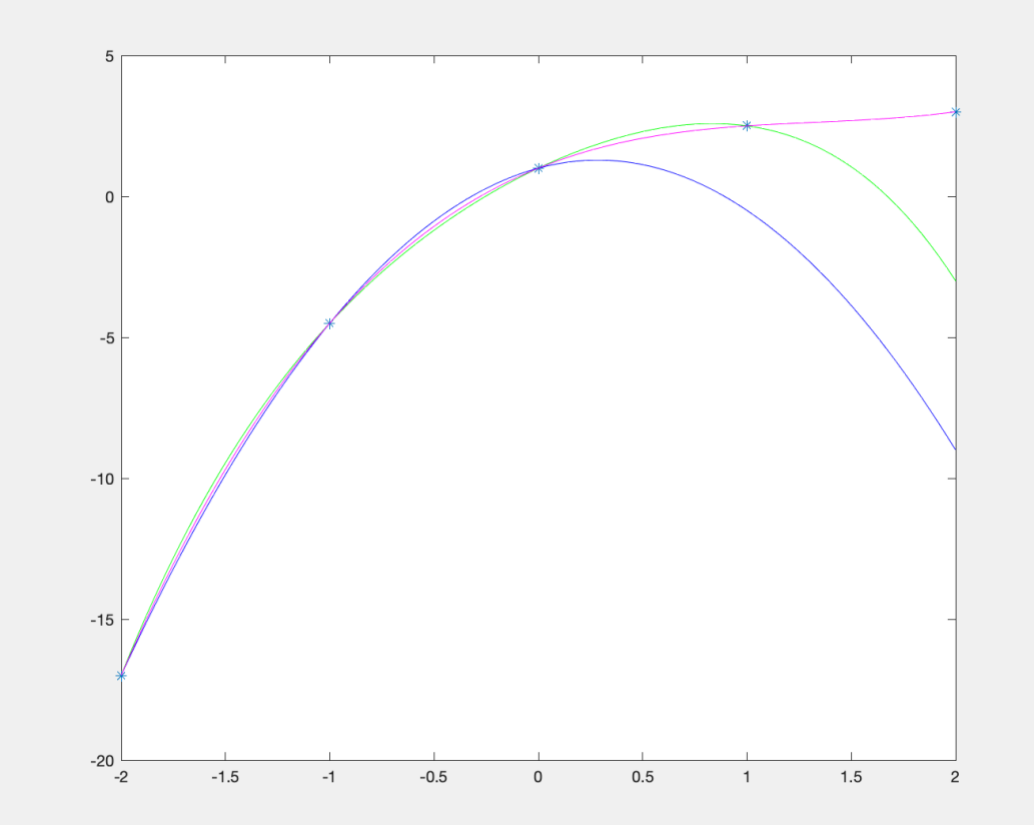
```
fx = @(x)0.5*x.^3 -2*x.^2+3*x+ 1;
p2x = @(x) -17+12.5.*(x+2)-3.5.*(x+2).*(x+1);
p3x = @(x) -17+12.5.*(x+2)-3.5.*(x+2).*(x+1) + 0.5.*(x+2).*(x+1).*(x);
p4x = @(x) -17+12.5.*(x+2)-3.5.*(x+2).*(x+1) + 0.5.*(x+2).*(x+1).*(x) - 0.25.*(x+2).*(x+1).*(x).*(x-1);

xData = [-2,-1, 0,1,2];

xPlot = linspace(-2,2,100);


plot(xData, fx(xData),'*', xPlot, p2x(xPlot), 'b', xPlot, p3x(xPlot), 'r', xPlot, p4x(xPlot), 'g',xPlot,fx(xPlot),
'm');
```

The plot is :


5
0
-5
-10
-15
-20
-2
-1.5
-1
-0.5
0
0.5
1
1.5
2