Matlab program of Newton formulas

Example:- consider the following data base

X	0	0.5	1	1.5
$f(x)$	1	1.25	2	3.25

Write Matlab programs that can be used to find:

1- f(0.25) close to the beginning of the data base

2- f(1.25) close to the end of the data base

3- f(0.75) close to the middle of the data base

Forward finite difference

```
x=[0,0.5,1,1.5];
y= [1,1.25,2,3.25];
xp=input('xp=');
h=0.5;
p=(xp-x(1))/h;
Dy0=y(2)-y(1);
D2y0=y(3)-2*y(2)+y(1);
yp=y(1)+p*Dy0+(p*(p-1)/2)*D2y0;
fprintf('f(%f)=%f',xp,yp);
```

$xp = 0.25$

$f(0.25) = 1.0625$

Centre finite difference

```
x=[0,0.5,1,1.5];
y= [1,1.25,2,3.25];
xp=input('xp=');
```

```
h=0.5;
p=(xp-x(2))/h;
q=1-p;
S2y1=y(3)-2*y(2)+y(1);
S2y2=y(4)-2*y(3)+y(2);
yp=p*y(3)+p*(p+1)*(p-1)*S2y2/factorial(3)+q*y(2)+q*(q+1)*(q-
1)*S2y1/factorial(3);
fprintf('f(%f)=%f',xp,yp);
```

$$xp = 0.75$$
$$f(0.75) = 1.5625$$

Backward finite difference

```
x=[0,0.5,1,1.5];
y= [1,1.25,2,3.25];
xp=input('xp=');
h=0.5;
p=(xp-x(4))/h;
By3=y(4)-y(3);
B2y3=y(4)-2*y(3)+y(2);
yp=y(4)+p*By3+(p*(p+1)/2)*B2y3;
fprintf('f(%f)=%f',xp,yp);
```

xp=1.25

f(1.25)=2.5625