Newton's forward difference formula:-

```
x = [3.0 3.2 3.4 3.6 3.8 4.0];
f = [-14 -10.032 -5.296 -0.256 6.672 14];
mat = zeros(6,7);
h = 0.2;
for i = 1:6
      mat(i,1) = x(i);
      mat(i,2) = f(i);
end
n=5; % number of iterations
for j=3:10
for i=1:n
mat(i,j)= mat(i+1,j-1)-mat(i,j-1)
end
n=n-1;
end
f01 = mat(1,3);
f02 = mat(1,4);
f03 = mat(1,5);
f04 = mat(1,6);
f05 = mat(1,7);

fDash(f01,f02,f03,f04,f05)
fDDash(f02,f03,f04,f05)
function val = fDash(f01,f02,f03,f04,f05)
val = (1/0.2)*(f01-(1/2*(f02))+(1/3*(f03))-(1/4*(f04))+(1/5*(f05)));
end
function val = fDDash(f02,f03,f04,f05)
val = (1/0.2^2)*(f02-f03+((11/12)*(f04)-((5/6)*f05)));
end
```

Newton's backward difference formula:-

```
x = [1 1.5 2.0 2.5 3.0];
f = [-1.5 -2.875 -3.5 -2.625 0.5];
mat = zeros(5,6);
for i = 1:5
      mat(i,1) = x(i);
      mat(i,2) = f(i);
end
n = 4
```

```
for j=3:6
for i=1:n
mat(i,j)= mat(i+1,j-1)-mat(i,j-1)
end
n=n-1;
end

f01 = mat(4,3);
f02 = mat(3,4);
f03 = mat(2,5);
fDash(f01,f02,f03)
function val = fDash(f01,f02,f03)
val = (1/0.5)*(f01+(1/2*(f02))+(1/3*(f03)));
end
```

27th feb:

stirling:

```
t=[-2 -1 0 1 2];
o=[23967 28060 31788 35209 38368];
dt=zeros(5,6);
for i=1:5
dt(i,1)=t(i);
dt(i,2)=o(i);
end
n=4;
for j=3:6
for i=1:n
dt(i,j)=dt((i+1),(j-1))-dt(i,(j-1))
end
n=n-1;
end
h=t(2)-t(1)
tp=0.2;
for i=1:5
q=(tp-t(i))/h;
if(q>(-0.25)&&q<(0.25))
p=q;
end
end
p
```

```
l=tp-(p*h);
for i=1:5
if(l==t(i))
r=i;
end
end
f0=o(r);
f11=dt((r-1),3);
f12=dt((r+1),3);
f02=dt((r-1),4);
f31=dt((r-2),5);
f32=dt((r-1),5);
f04=dt((r-2),6);
fp=f0+(p*(f11+f12))/2+((p*p)*f02)/2+(p*((p*p)-1)*(f31+f32))/12+((p*p)*((p*p)-1)*f04)/24
```

Cubic spline:

```
clc
clear all
x=[0,1,2];
f=[-1,3,29];
M(1)=0;
M(3)=0;
y=[0.5,1.5];
i=2;
h=x(2)-x(1)
M(i)=((6*(f(i+1)-2*f(i)+f(i-1)))/(h^2)-M(i-1)-M(i+1))/4
for j=1:2
F(j)=
(((M(j)*(x(j+1)-y(j))^3)+M(j+1)*((y(j)-x(j))^3))/6)+(x(j+1)-y(j))*(f(j)-(M(j)/6))+(y(j)-x(j))*(f(j+1)-(M(j+1)
)/6);
End
```

20th feb:

Langrange interplation:

```
x=[0.1745 0.3491 0.5236];
y=[1.1585 1.2817 1.3660];
sum=0;
```

```
for i=1:length(x)
   p=1;
   for j=1:length(x)
      if j~=i
         c = poly(x(j))/(x(i)-x(j));
         p = conv(p,c);
      end
   end
   term = p*y(i);
   sum= sum + term;
end
disp(sum);
```

Newtons:

```
x = [-4 -1 0 2 5];
f = [1245 33 5 9 1335];
val1 = [0 0 0 0];
val2 = [0 0 0];
val3 = [0 0];
val4 = [0];
disp("First d.d:-");
for i = 1:4
   div = x(i+1)-x(i);
   value = f(i+1)-f(i);
   res = value/div;
    val1(i) = res;
end
disp("Second d.d:-")

for i = 1:3
   div = x(i+2)-x(i);
   value = val1(i+1)-val1(i);
   res = value/div;
   val2(i) = res;
end
disp("Third d.d:-")
for i = 1:2
   div = x(i+3)-x(i);
   value = val2(i+1)-val2(i);
```

```
    res = value/div
    val3(i) = res;
end
disp("Fourth d.d:-")
for i = 1:1
    div = x(i+3)-x(i);
    value = val2(i+1)-val2(i);
    res = value/div
    val3(i) = res;
end
```