-ARJUN
-DHAWAN
-2CS10
102016055

Lagrange Interpolation

The following data define the sea-level concentration of dissolved oxygen for fresh water as a function of temperature:

t	0	8	16	24	32	40
$O(t)$	14.621	11.843	9.870	8.418	7.305	6.413

Use Lagrange's interpolation formula to approximate the value of $O(15)$ and $O(27)$.

```
x = [0 8 16 24 32 40];
y = [14.621 11.843 9.870 8.418 7.305 6.413];
n = length(x);

xp = input("Enter values :")
for k=1:length(xp)
    sum = 0;
    for i=1:n
        pr=1;
        for j=1:n
            if j~=i
                pr=pr.*(xp- x(j))/(x(i)-x(j));
            end
        end
        sum = sum + y(i) * pr;
    end

end
fprintf("Approximation : %f\n",sum);
```

```
Enter values :[15,27]

xp =

    15    27

Approximation : 10.083444
Approximation : 7.968239
```

Generate eight equally-spaced points from the function $f(x) = \sin^2 x$ from $x = 0$ to 2π. Use Lagrange interpolation to approximate $f(0.5), f(3.5), f(5.5)$ and $f(6.0)$.

```
x=linspace(0,(2*pi),8)
y=sin(x).*sin(x)
n=length(x)
xp = input("Enter values :")
for k=1:length(xp)
    sum = 0;
    for i=1:n
        pr=1;
        for j=1:n
            if j~=i
                pr=pr.*(xp- x(j))/(x(i)-x(j));
            end
            enda
        sum = sum + y(i) * pr;
    end

end
fprintf("Approximation : %f\n",sum);
```

```
Enter values :[0 3.5 5.5 6.0]

xp =

         0    3.5000    5.5000    6.0000

Approximation : 0.000000
Approximation : 0.131741
Approximation : 0.447728
Approximation : -0.180962
```