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Practical 9
Lagrange interpolation

AIM :- To estimate the values of Exp[0.5], Exp[-0.7] and Exp[0.3] by constructing the lagrange's form of interpolating polynomial for f passing through (-1,Exp[-1]), (0,1) and (1,Exp[1])

```
In[1]:= Lagrange1[x_, f_, y_] := Module[{}, s = 0; m = Length[x]; p = 1;
          For[i = 1, i c m, i = i + 1,
           For[j = 1, j c m, j = j + 1,
            If[j   i,
              p = p x (y - x[[j]]) / (x[[i]] - x[[j]]); Continue;];];
           s = s + p x f[[i]]; p = 1;];
          Print["Function value at y=", s];
          Print["Absolute error=", Abs[s - Exp[y]]];]
```

```
In[2]:= x = {-1, 0, 1 };
        f = {Exp[-1], 1, Exp[1]};
        Lagrange1 x, f, 0.5

        Function value at y=1.72337

        Absolute error=0.0746495
```

```
In[5]:= Lagrange1 x, f, - 0.7

        Function value at y=0.443469

        Absolute error=0.0531166
```

```
In[6]:= Lagrange1 x, f, 0.3

        Function value at y=1.40144

        Absolute error=0.0515788
```

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In[7]:= Clear f, x, s, i, j
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```
In[8]:= Lagrange2 [xi_, f_, x_] := Module [{}, s = 0; m = Length [xi] ; p = 1;
          For[i = 1, i c m, i = i + 1,
           For [j = 1, j c m, j = j + 1,
            If[j   i,
              p = p x (x - xi[[j]]) / (xi[[i]] - xi[[j]]); Continue; ];];
           s = s + p x f[[i]]; p = 1;];
          Print["The polynomial is"];
          Print "p", m - 1, "= ", Simplify s   ;

In[9]:= xi = {0, 1, 3 };
        f = {1, 3, 55};
        Lagrange2  xi, f, x

        The polynomial is

        p2= 1 - 6 x + 8 x^2

In[12]:= Lagrange2  xi, f, 2

        The polynomial is

        p2= 21
```