



SNS COLLEGE OF TECHNOLOGY

(An Autonomous Institution) Coimbatore-641035.

Department Of Mathematics

UNIT 4 – Interpolation , Numerical Differentiation and Integration

INVERSE INTERPOLATION...

Inverse Interpolation is the process of finding the value of x corresponding to the values of y , not present in the table.

Prob 1. Obtain the root of $f(x)=0$ by Lagrange Inverse Interpolation given that $f(30) = -30$, $f(34) = -13$, $f(38) = 3$, $f(42) = 18$.

x	30	34	38	42
x_0		x_1	x_2	x_3
y	-30	-13	3	18
y_0		y_1	y_2	y_3

By Lagrange's Inverse Interpolation formula:

$$\Rightarrow x = f(y) = \frac{(y-y_1)(y-y_2)(y-y_3)}{(y_0-y_1)(y_0-y_2)(y_0-y_3)} x_0 + \frac{(y-y_0)(y-y_2)(y-y_3)}{(y_1-y_0)(y_1-y_2)(y_1-y_3)} x_1 +$$

$$\frac{(y-y_0)(y-y_1)(y-y_3)}{(y_2-y_0)(y_2-y_1)(y_2-y_3)} x_2 + \frac{(y-y_0)(y-y_1)(y-y_2)}{(y_3-y_0)(y_3-y_1)(y_3-y_2)} x_3$$

$$\Rightarrow \left[\frac{(y+13)(y-3)(y-18)}{(-30+13)(-30-3)(-30-18)} \times (30) \right] + \left[\frac{(y+30)(y-3)(y-18)}{(-13+30)(-13-3)(-13-18)} \times (34) \right] +$$

$$\left[\frac{(y+30)(y+13)(y-18)}{(3+30)(3+13)(3-18)} \times (38) \right] + \left[\frac{(y+30)(y+13)(y-3)}{(18+30)(18+13)(18-3)} \times (42) \right]$$

$$\Rightarrow \left[\frac{(y+13)(y-3)(y-18)}{-26928} \times (30) \right] + \left[\frac{(y+30)(y-3)(y-18)}{8432} \times (34) \right] +$$

$$\left[\frac{(y+30)(y+13)(y-18)}{-7920} \times (38) \right] + \left[\frac{(y+30)(y+13)(y-3)}{22320} \times (42) \right]$$

$$y(0) \Rightarrow \left[\frac{(3)(-3)(-18)}{-26928} \times (30) \right] + \left[\frac{(30)(-3)(-18)}{8432} \times (34) \right] +$$

$$\left[\frac{(30)(13)(-18)}{-7920} \times (38) \right] + \left[\frac{(30)(13)(-3)}{22320} \times (42) \right]$$



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$$\begin{aligned} &\Rightarrow \left[\frac{702}{-26928} \times (30) \right] + \left[\frac{1620}{8432} \times (34) \right] + \left[\frac{-7020}{-7920} \times (38) \right] + \\ &\quad \left[\frac{-1170}{22320} \times (42) \right] \\ &\Rightarrow [-0.026 \times 30] + [0.1921 \times 34] + [0.886 \times 38] + [-0.052 \times 42] \\ &\Rightarrow -0.782 + 6.5323 + 33.682 - 2.202 \\ &\Rightarrow 37.230/- \end{aligned}$$