

CS ASSIGNMENT

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1) The follow. table is given

| | | | | |
|------|---|---|----|-----|
| x | 0 | 1 | 2 | 5 |
| f(x) | 2 | 3 | 12 | 147 |

what is the form of $f(x)$?

find $f(3) = ?$

$$1) f(3) = \frac{(3-1)(3-2)(3-5)}{(0-1)(0-2)(0-5)} \times 2$$

$$+ \frac{(3-0)(3-2)(3-5)}{(1-0)(1-2)(1-5)} \times 3$$

$$+ \frac{(3-0)(3-1)(3-5)}{(2-0)(2-1)(2-5)} \times 12$$

$$+ \frac{(3-0)(3-1)(3-2)}{(5-0)(5-1)(5-2)} \times 147$$

$$f(3) = \frac{(+2)(1)(-2)}{(-1)(-2)(-5)} \times 2 + \frac{3 \cdot 1 \cdot (-2)}{1 \cdot (-1) \cdot (-4)} \times 3$$

$$+ \frac{3 \cdot 2 \cdot (+2)}{2 \cdot (1) \cdot (+3)} \times 12 + \frac{3 \cdot 2 \cdot 1}{5 \cdot 4 \cdot 3} \times 147$$

$$f(3) = \frac{4}{5} - \frac{2}{2} + 24 + \frac{147}{10} = \frac{-37}{10} + 24 + \frac{147}{10}$$

$$f(3) = \frac{110}{10} + 24 = 35 \Rightarrow \boxed{f(3) = 35}$$

2) Apply Lagrange's formula to find $f(5)$ given that

$$f(1) = 2, f(2) = 4, f(3) = 8, f(4) = 16, f(7) = 128$$

$$f(5) = \frac{(5-2)(5-3)(5-4)(5-7)}{(1-2)(1-3)(1-4)(1-7)} \times 2$$

$$+ \frac{(5-1)(5-3)(5-4)(5-7)}{(2-1)(2-3)(2-4)(2-7)} \times 4$$

$$+ \frac{(5-1)(5-2)(5-4)(5-7)}{(3-1)(3-2)(3-4)(3-7)} \times 8$$

$$+ \frac{(5-1)(5-2)(5-3)(5-7)}{(4-1)(4-2)(4-3)(4-7)} \times 16$$

$$+ \frac{(5-1)(5-2)(5-3)(5-4)}{(7-1)(7-2)(7-3)(7-4)} \times 128$$

$$\Rightarrow \frac{2 \cdot 4 \cdot 1 \cdot (-2)}{1 \cdot 2 \cdot 3 \cdot 8} \cdot 2 + \frac{4 \cdot 2 \cdot 1 \cdot (-2)}{1 \cdot (+1) \cdot 2 \cdot 5} \cdot 4$$

$$+ \frac{4 \cdot 3 \cdot 1 \cdot (-2)}{2 \cdot 1 \cdot 1 \cdot 4} \cdot 8 + \frac{4 \cdot 3 \cdot 2 \cdot (-2)}{3 \cdot 2 \cdot 1 \cdot (+3)} \cdot 16$$

$$+ \frac{4 \cdot 3 \cdot 2 \cdot 1}{3 \cdot 6 \cdot 3 \cdot 48} \cdot 128$$

$$\Rightarrow -\frac{2}{3} + \frac{32}{5} - 24 + \frac{128}{3} + \frac{128}{15}$$

$$\Rightarrow \frac{25 - 24 \cdot 15 + 32 \cdot 3 + 128 \cdot 5 + 128}{15}$$

$$\rightarrow \frac{10 \cdot 360 + 36 + 640 + 128}{15}$$

$$\rightarrow 32.6933$$

$$\therefore f(s) = 32.93$$