Problem

Thursday, September 28, 2023 5:45 PM

Find the missing terms :-

$x_0 = 0.0$ $f(x_0) = ?$ $f(x_0, x_1) = ?$ $f(x_0, x_1, x_2) = \frac{50}{7}$

$x_1 = 0.4$ $f(x_1) = ?$ $f(x_1, x_2) = 10$

$x_2 = 0.7$ $f(x_2) = 6$

Sol Using Newton Divided differences.

we know that

$$f(x_0, x_1) = \frac{f(x_1) - f(x_0)}{x_1 - x_0} \quad \text{---} \quad (1)$$

$$f(x_1, x_2) = \frac{f(x_2) - f(x_1)}{x_2 - x_1} \quad \text{---} \quad (2)$$

$$f(x_0, x_1, x_2) = \frac{f(x_1, x_2) - f(x_0, x_1)}{x_2 - x_0} \quad \text{---} \quad (3)$$

Now putting values :-

(3) Becomes

$$\frac{50}{7} = \frac{10 - f(x_0, x_1)}{0.7 - 0}$$

$$\frac{0.7}{1} \times \frac{50}{7} = \frac{10 - f(x_0, x_1)}{} \times 0.7$$

$$\frac{0.7}{10} \times \frac{50}{7} = \frac{10 - f(x_0, x_1)}{0.7} \times 0.1$$

$$5 = 10 - f(x_0, x_1)$$

$$\Rightarrow \boxed{f(x_0, x_1) = 5}$$

Now using eq (2)

$$f(x_1, x_2) = \frac{f(x_2) - f(x_1)}{x_2 - x_1}$$

$$10 = \frac{6 - f(x_1)}{0.7 - 0.4}$$

$$0.3 \times 10 = \frac{6 - f(x_1)}{0.3} \times 0.3$$

$$3 = 6 - f(x_1)$$

$$\Rightarrow \boxed{f(x_1) = 3}$$

Now using eq ①

$$f[x_0, x_1] = \frac{f(x_1) - f(x_0)}{x_1 - x_0}$$

$$5 = \frac{3 - f(x_0)}{0.4 - 0.0}$$

$$0.4 \times 5 = \frac{3 - f(x_0)}{0.4} \times 0.4$$

$$2 = 3 - f(x_0)$$

$$\Rightarrow \boxed{f(x_0) = 1}$$

Hence the required values