Solve the following non-linear equation.

$$x \cos x - 2x^2 + 3x - 1 = 0 ; \qquad 0.2 \le x \le 0.3$$

Sol:-

$f(x) = x \cos x - 2x^2 + 3x - 1$

$f(x_n) = x_n \cos x - 2x_n^2 + 3x_n - 1$

$f'(x_n) = \cos x_n - x_n \sin x_n - 4x_n + 3$

Let $n = 0$

$$x_1 = x_0 - \frac{f(x_0)}{f'(x_0)}$$

$x_0 = 0.2$

$$x_1 = 0.2 - \frac{(0.28399)}{(3.14033)}$$

$= 0.2 + 0.09043$

$= 0.29043$ ')

Let $n = 1$

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

$$x_2 = (0.29043) - \frac{f(0.29043)}{f'(0.29043)}$$

$$= 0.29043 - \frac{(-0.01914)}{2.71323}$$

$$= 0.29043 + 0.00705$$
$$= 0.29748 .$$

n	x_n	$f(x_n)$	$f'(x_n)$	x_{n+1}
0	0.2	-0.28399	3.14033	0.29043
1	0.29043	-0.01914	2.71323	0.29748
2	0.29748			

$$\frac{1}{5} \quad 0.2$$

Stop when $f(x)$ will start become 0 or x_{n+1} will be repeating...

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