$$c = a + \frac{-bf(a) - af(a)}{f(b) - f(a)}$$

$$c = \frac{af(b) - af(a) - bf(a) + af(a)}{f(b) - f(a)}$$

$$\boxed{c = \frac{af(b) - bf(a)}{f(b) - f(a)}}$$

Q Find the root for the given non-liner equation upto with in 10^{-5}

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

Sol:-

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

$a = 0.2$

$f(a) = (0.2)\cos(0.2) - 2(0.2)^2 + 3(0.2) - 1$

$= 0.19601 - 0.08 + 0.6 - 1$

$= -0.28399$

$b = 0.3$

$f(b) = (0.3)\cos(0.3) - 2(0.3)^2 + 3(0.3) - 1$

$= 0.28660 - 0.1800 + 0.9 - 1$

$= 0.00660.$

$$c = \frac{af(b) - bf(a)}{f(b) - f(a)}$$

$$c = \frac{(0.2)(0.00660) - (0.3)(-0.28399)}{(0.00660) - (-0.28399)}$$

$$c = \frac{0.00132 + 0.08520}{0.29059}$$

$$c = \frac{0.08652}{0.29059}$$

$$c = 0.29774$$

$$f(c) = (0.29774)\cos(0.29774) - 2(0.29774)^2 + 3(0.29774) - 1$$

$$= 0.28464 - 0.17730 + 0.89322 - 1$$

$$= 0.00056$$

i	a	f(a)	b	f(b)	c	f(c)
1	0.2	-0.28399	0.3	0.006601	0.297728	0.000531
2	0.2	-0.28399	0.297728	0.000531	0.297546	0.00004
3	0.2	-0.28399	0.297546	0.00004	0.297531	0.00000