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CPE-201

Given:  $f(x) = \cos x - 3x + 5$

[1, 2]

$$x_L = 1 \quad \text{and} \quad x_U = 2$$

$$f(x_L) = \cos 1 - 3(1) + 5 \\ = 2.5403$$

$$f(x_U) = \cos 2 - 3(2) + 5 \\ = -1.4161$$

$$f(x_L) f(x_U) = -3.5973$$

$$x_r = \frac{1+2}{2} \\ = 1.5$$

$$f(x_r) = \cos(1.5) - 3(1.5) + 5$$

Iteration	$x_L$	$x_U$	$x_r$	$f(x_L)$	$f(x_r)$	$\epsilon_a$
1	1	2	1.5	2.5403	0.5707	
2	1.5	2	1.75	0.5707	-0.4282	14.2857%
3	1.5	1.75	1.625	0.5707	0.0708	7.6923%
4	1.625	1.75	1.6875	0.0708	-0.1789	8.7037%
5	1.625	1.6875	1.6563	0.0708	-0.0543	1.8837%
6	1.625	1.6563	1.6407	0.0708	0.0081	0.9508%
7	1.6407	1.6563	1.6485	0.0081	-0.0231	0.4732%
8	1.6407	1.6485	1.6446	0.0081	-0.0075	0.2371%
9	1.6407	1.6446	1.6427	0.0081	0.0001	0.1157%
10	1.6427	1.6446	1.6437	0.0001	0.0039	0.0608%

$$x = 1.6437 \text{ with } \epsilon_a = \left| \frac{1.6437 - 1.6427}{1.6437} \right| \times 100 = 0.0608\%$$



# False Position Method

$$\cos x - 3x + 5$$

$$x_r = 2 - \frac{f(1.4161)(1-2)}{2.5403 - (-1.4161)} = 1.6421$$

$$f(x_r) = \cos(1.6421) - 3(1.6421) + 5 = 0.0025$$

$$f(x_L)f(x_r) = (2.5403)(0.0025) = 0.0064$$

Iteration	$x_L$	$x_U$	$f(x_L)$	$f(x_U)$	$x_r$	$f(x_r)$	$f(x_L)f(x_r)$	$\epsilon_a$
1	1	2	2.5403	-1.4161	1.6421	0.0025	0.0064	
2	1.6421	2	0.0025	-1.4161	1.6427	0.0000	0.0000	0.0365%

$$x = 1.6427 \text{ with } \epsilon_a = \left| \frac{1.6427 - 1.6421}{1.6427} \right| \times 100 = 0.0365\%$$