Camlin

* LAB-2

Ans 1) • for (0, 1) the root obtained is 0.61906 for ~~10~~ 15 iterations

• for (1, 2), the root obtained is 1.5121 for ~~10~~ 15 iterations.

• On increasing no. of iterations, the accuracy of answer increases. It also depends on the precision point of the program.

Ans 2) • for Bisection Method after 21 iterations the error is below 10^{-6} for 3 iterations the answer is 1.4142

• for Newton' Method after 4 iterations, the error is below 10^{-6}, for 3 iterations the answer is 1.41215

• Newton's Method is more efficient than Bisection Method in this context.

Ans 3) • Since there are multiple roots, we select the interval [-4, -2] to find the answer, closest to 0.

• for 50 iterations, the answer is -3.1831, on increasing iterations the accuracy increases

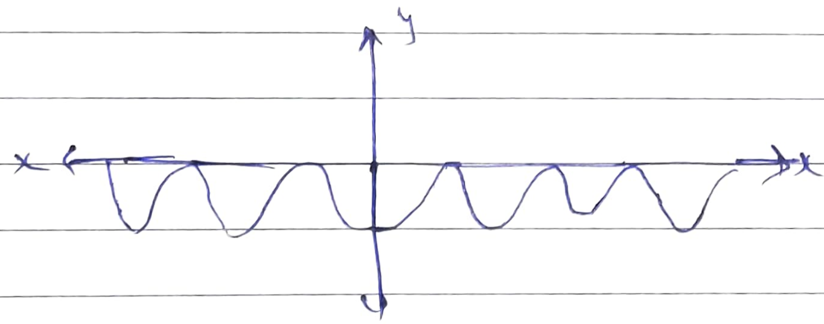
Ans 4) On starting with ~~1~~ 0, we will get an answer which is diverging because $f'(x) = \cancel{\ldots}\ \sin(x) - 2xe^{-x^2}$. At 0, the whole term becomes 0, hence the ~~denominator~~ overall term tends to ∞.

• With $x_0 = 1$ & 50 iterations, we obtain the root 9.428092.

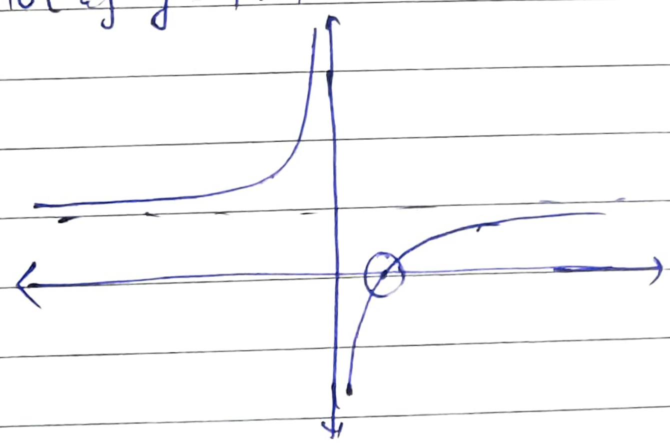
• To obtain a root in $[0, 4]$, we need to ~~increase~~ change the value of x. With $x_0 = 1.5$ and 50 iterations, the root is 3.1311. The same answer is obtained with $x_0 = 2$

• This happens because of the initial starting point assumptions, and the fact it has multiple roots. Also, the f^n is almost completely below the x-axis.

$y(x) = e^{-x^2} - \cos x - 1$



Ans 9 Plot of $y = f(x)$



• With $a = 0$ in $[a, b]$ we get a wrong answer, because we obtain a $c/0$ form in the eq^n.

• Start from a value close to 0, but greater than it.

With the interval $[10^{-6}, 1]$, the root is 1.255×10^{-6} for 10 iterations.

Ans 6) y(0) is initialised to 0. for subsequent y(i), y(i-1) is considered as a reference point for the equation.

x	y
0	0
0.1083	0.6605
0.2167	0.9473
⋮	⋮
2.9249	3.0274
3.033	3.0846
3.1416	3.1416

(with 5 iterations)

- on increasing iterations, precision of answer increases.

Ans 7) y(0) is initialised to 1. For subsequent y(i), y(i-1) is considered as a reference point.

x	y
0	1
0.1	1.0001
0.2	1.0006
⋮	⋮
9.8	-26.4771
9.9	-26.8562
10	-27.2368

(5 iterations)

- on increasing iterations, precision increases

Ans 8) • on performing 2 iterations, we don't really reach the actual answer due to limited no. of steps.

$x_1 = 0.54167$, $x_2 = 1.29$

• On taking 10 iterations, we converge towards the correct answer.

$x_1 = 0.44908$, $x_2 = 0.89816$

Hence increasing iterations, increases the accuracy.