

Lab 2

1.) $f(x) = e^x - 3x$. Threshold = $1E-6$

$f(0) > 0$

$f(1) < 0$

$f(2) > 0$.

interval ~~$[0, 1]$~~
 root = 0.6190
 iterations = 18

interval $[1, 2]$
 root = 1.512
 iterations = 21

2.) $y = \sqrt{x^2 - 2}$

Newton's method

Bisection method

$$x_{n+1} = \frac{1}{2} \left(x_n + \frac{N}{x_n} \right)$$

$x_0 = 1$

root = 1.414214

iterations = 4

root: 1.414213
 iterations = 21

3.) $e^x - \sin x = 0 = f(x)$

$f(0) > 0$

$f(-7) > 0$

$f(1) > 0$

$f(-3) > 0$

$f(-4) < 0$

$f(-5) < 0$

$f(-6) < 0$

In Interval $[-4, 1]$

root = -3.183

iterations = 18

accuracy = 10^{-6}

root = 3.183

iterations = 25

accuracy = 10^{-7}

4.) Using bijection we get
no roots in the interval
Because $f(0) * f(4) > 0$

However it is incorrect as we
have a root. Thus we use
newtons method.

$x_0 = 0$

result = NaN

$x_0 = 1$

result = 9.4248

$x_0 = 2$

result = 3.1318

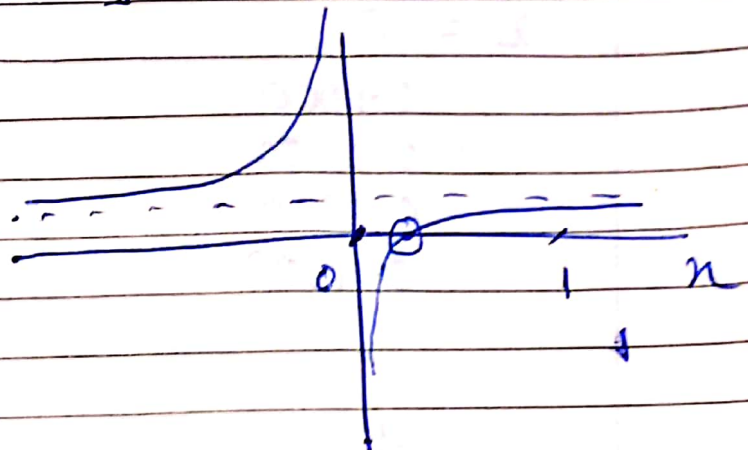
$$f(x)$$

$$f(0^+) < 0$$

$$f(1) > 0$$

$$f(10^{-5}) > 0$$

$$f(10^{-4}) > 0$$



6.) $y - 0.9 \sin(y) - \pi = 0$

where $x = \text{linspace}(0, \pi, 30)$
Thus we get 30 values of y

$$x = 0$$

$$y = 0$$

Q. 1083

0.6605

0.2167

0.9473

0.3250

1. 1444

0.4333

1.3007

0.5417

1. 4331

0-6500

0.7583

0.8666

20. a 249

$$3.0274$$

3. 0 333

3.0846

3. 1416

$$3.1416$$

7.) We get 101 values.

$z = 0$	$y = 1.0000$
0.1000	1.0001
0.2000	1.0006
0.3000	1.0020
0.4000	!
:	!
:	-26.4771
9.9000	-26.8562
10.0000	-27.2368

8.) After one iteration the result does not converge.

However, after 2 iterations

$$\left. \begin{array}{l} x_1 = 0.4490 \\ x_2 = 0.8981 \end{array} \right\} \text{ which is close to analytical.}$$