

Assignment-3

Course: SC-374

Computational and Numerical Methods

Instructor: Prof. Arnab Kumar

Made by:

Yatin Patel – 201601454

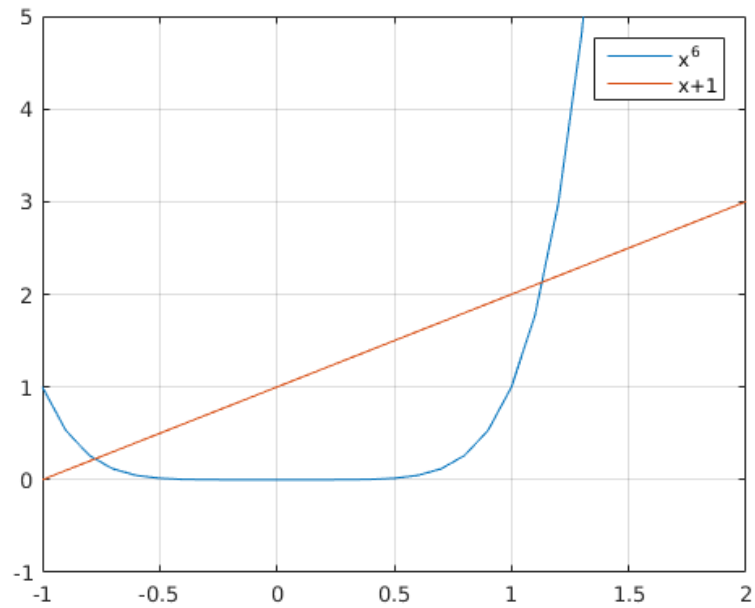
Rutvik Kothari – 201601417

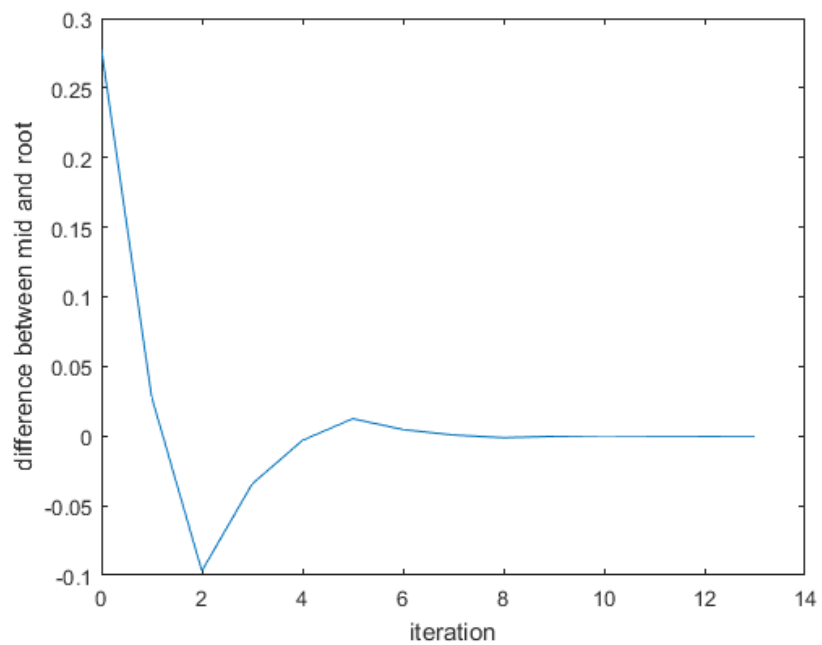
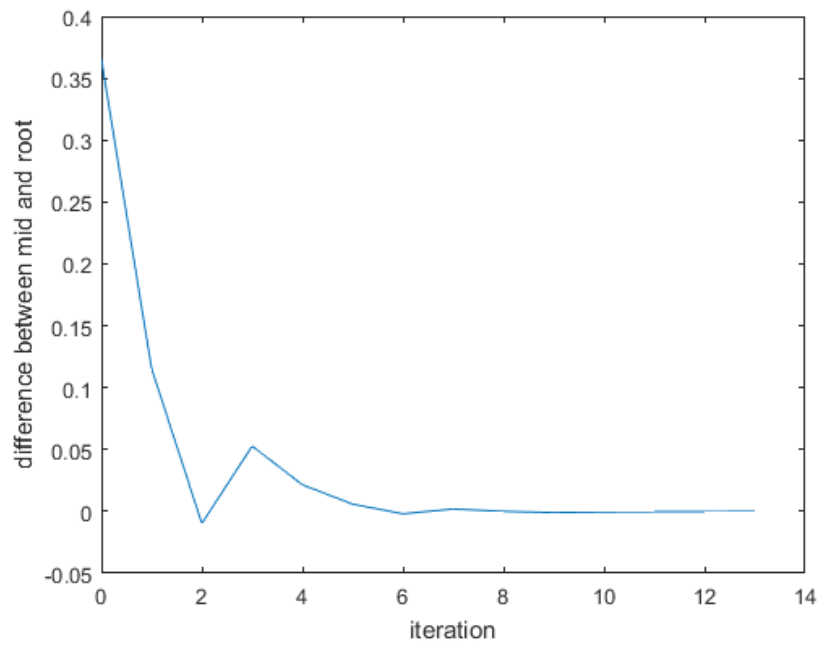
Problem: 1

◆ Statement:

Write a code, applying the algorithm of the bisection method to determine both the real roots of $f(x) = x^6 - x - 1 = 0$.

◆ Graphs:





♦ **Observations:**

Smallest Root which we are getting is at $x = -0.7781$.

Largest Root which we are getting is at $x = 1.1347$.

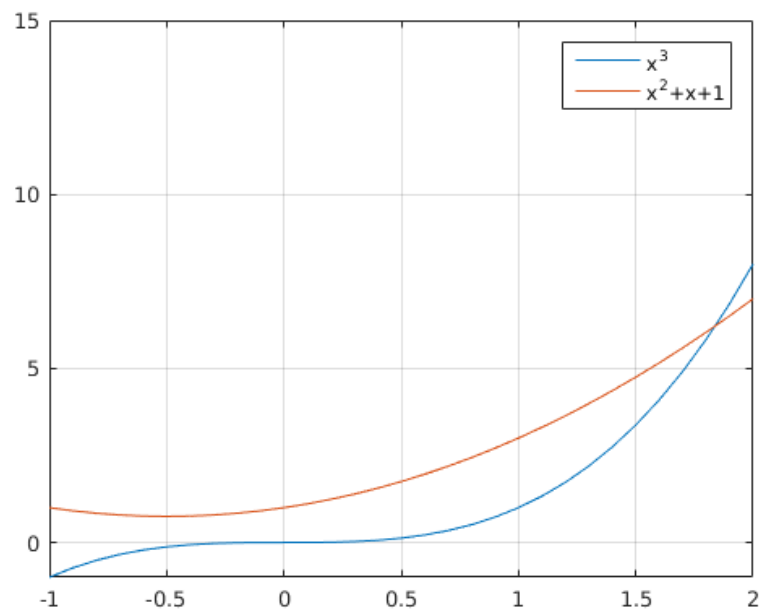
Problem: 2

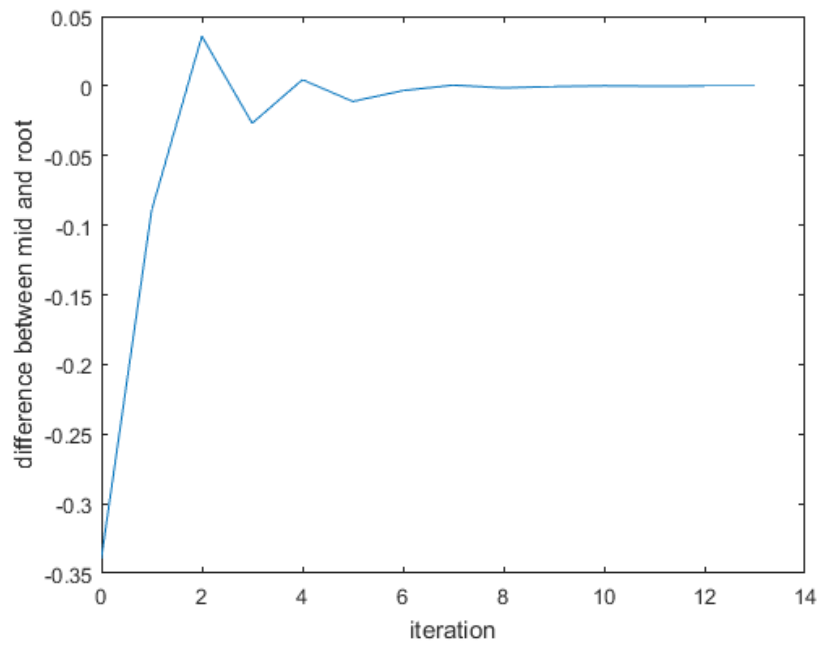
◆ Statement:

Use the bisection method to find the real roots of the following functions, using an error tolerance of $\epsilon = 0.0001$.

$$(A) \ f(x) = x^3 - x^2 - x - 1 = 0$$

◆ Graphs:



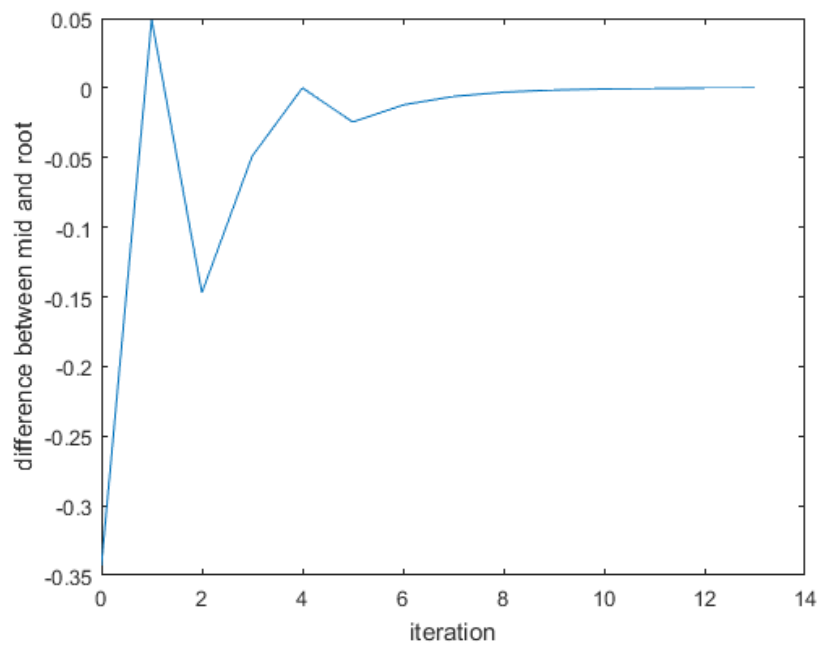
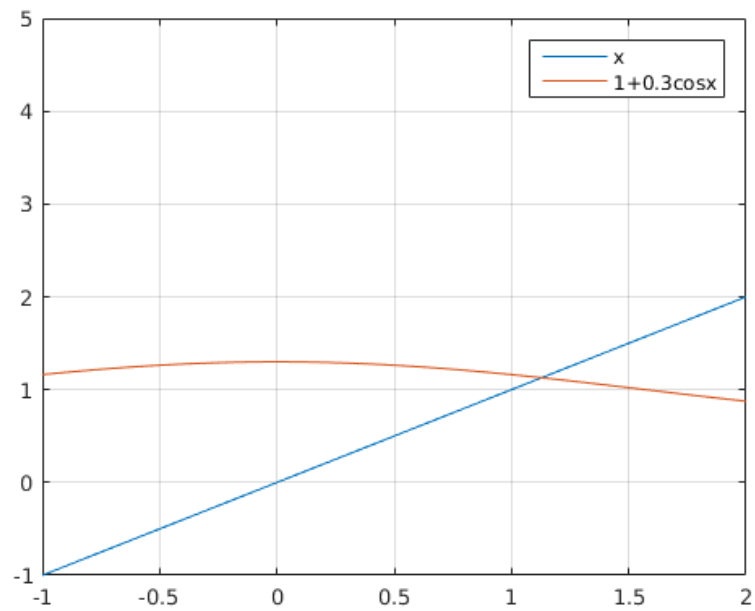


♦ **Observations:**

Root which we are getting is at $x = 1.8393$.

(B) $f(x) = x - 1 - 0.3\cos x = 0$

♦ **Graphs:**

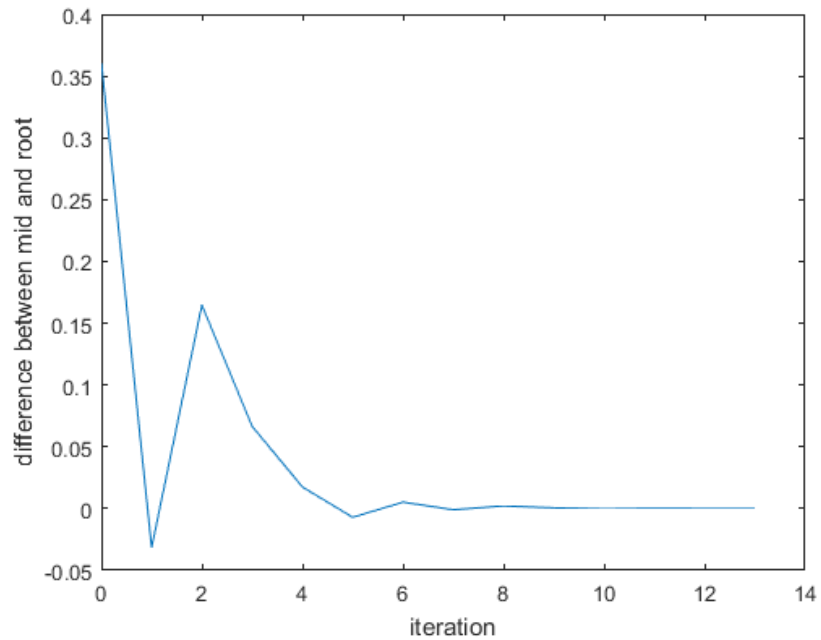
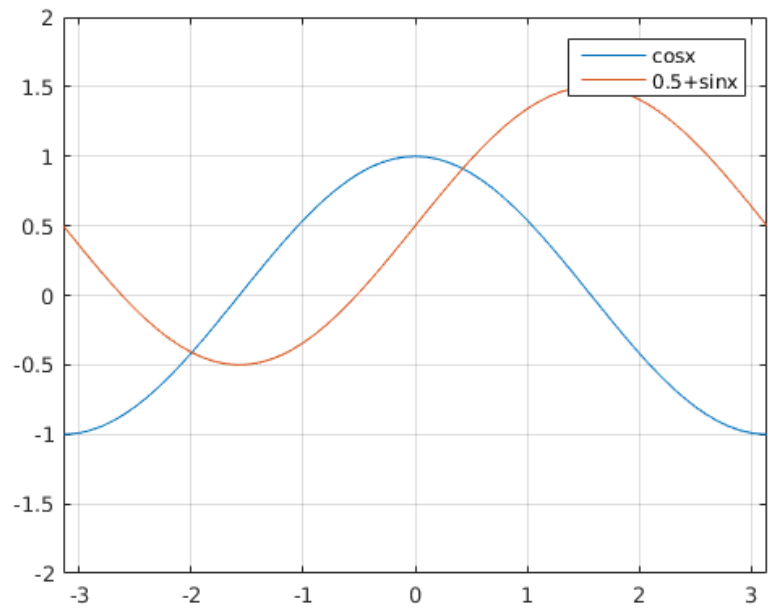


♦ **Observations:**

Root which we are getting is at $x = 1.1284$.

(C) $f(x) = \cos x - \sin x - 0.5 = 0$

◆ **Graphs:**

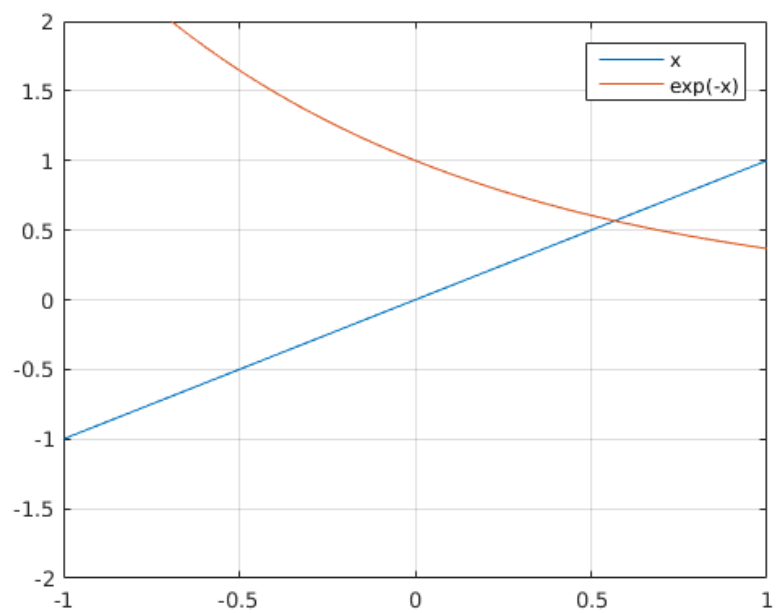


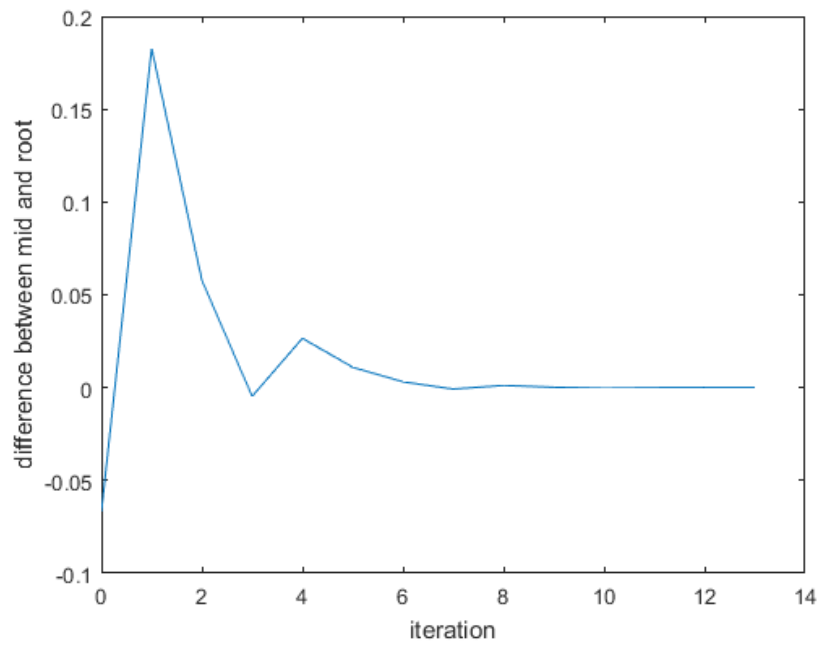
◆ **Observations:**

Root which we are getting is at $x = 0.4241$.

$$(D) \ f(x) = x - e^{-x} = 0$$

♦ Graphs:



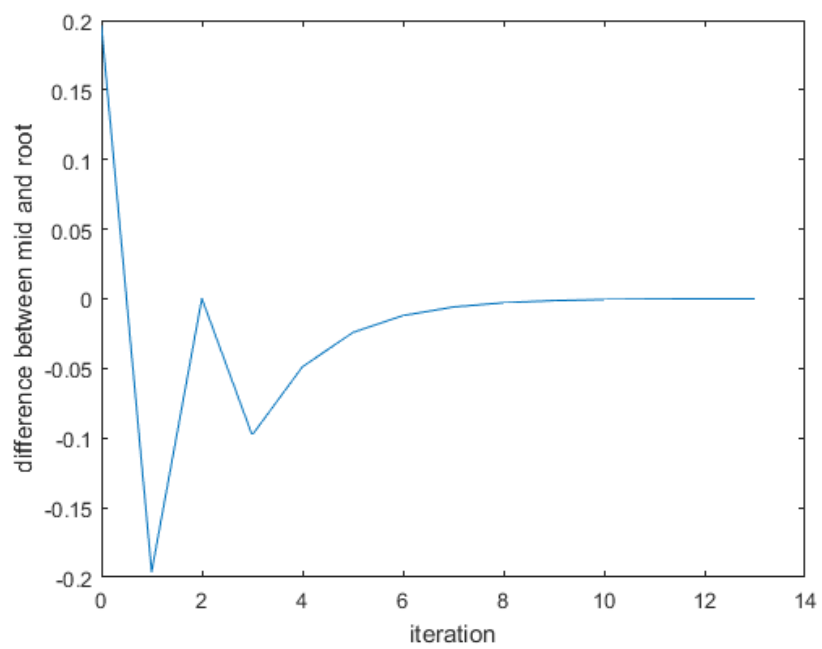
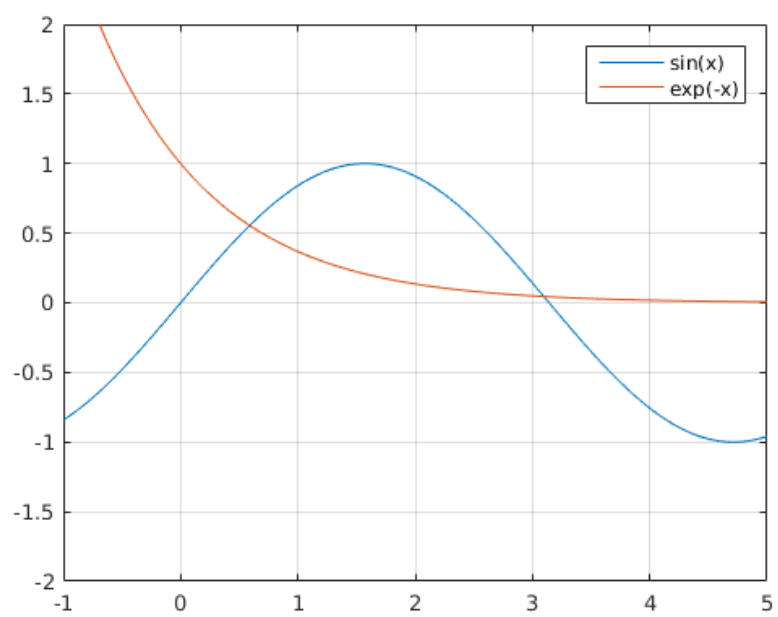


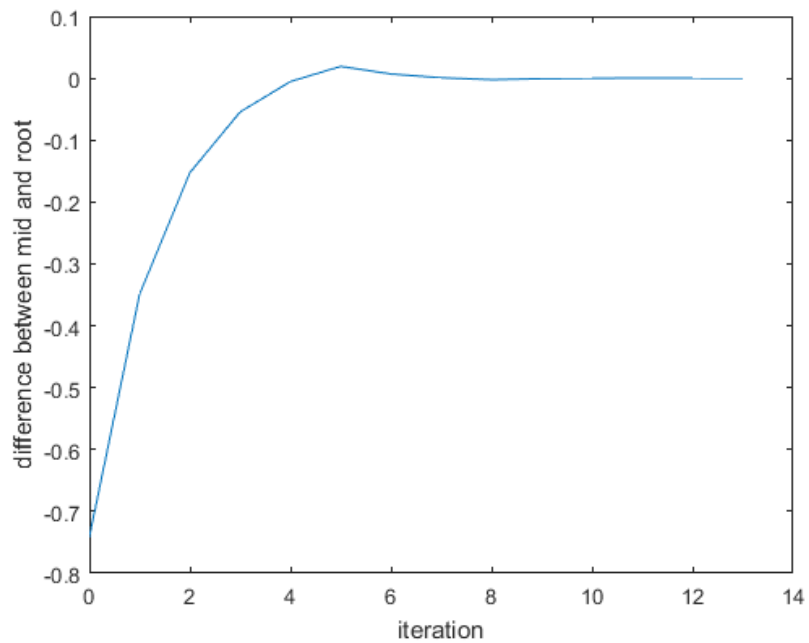
♦ **Observations:**

Root which we are getting is at $x = 0.5672$.

$$(E) \ f(x) = e^{-x} - \sin x = 0$$

♦ **Graphs:**





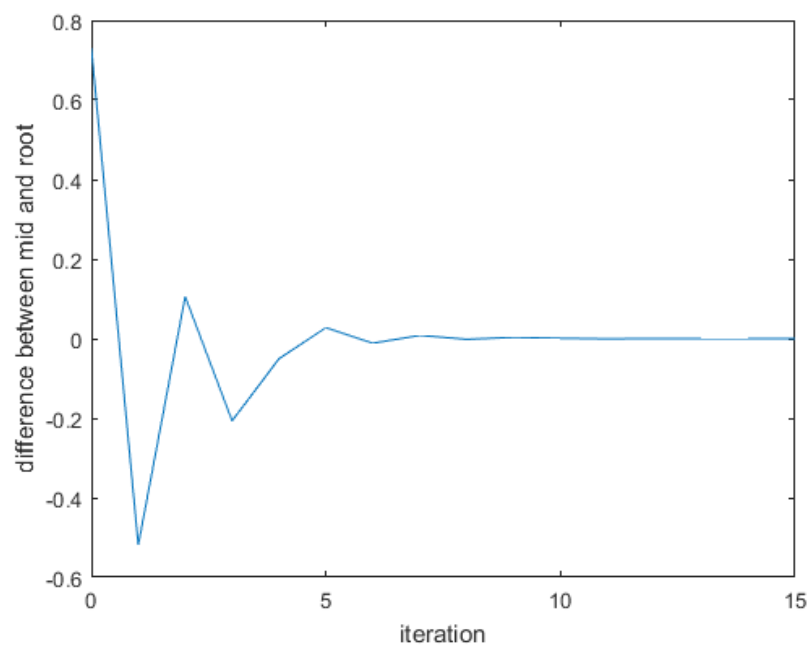
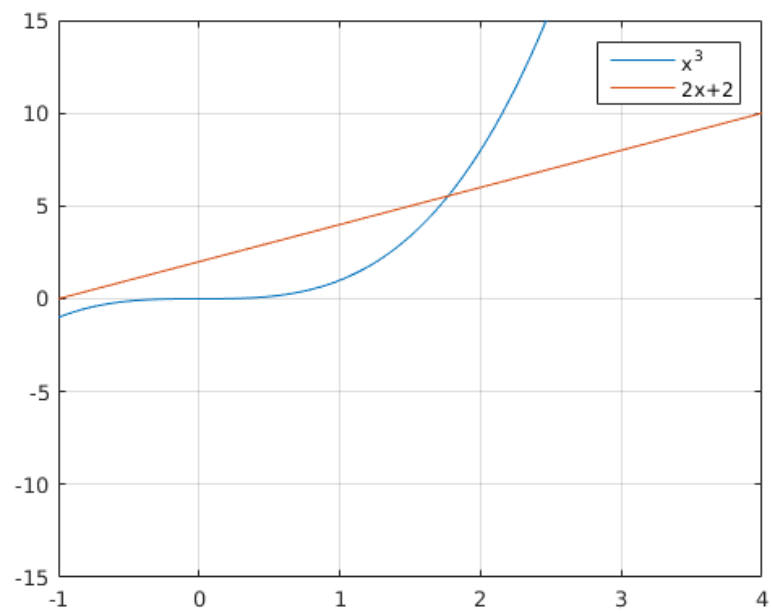
♦ **Observations:**

Root which we are getting is at $x = 0.5885$.

Root which we are getting is at $x = 3.0964$.

$$(F) \ f(x) = x^3 - 2x - 2 = 0$$

♦ **Graphs:**

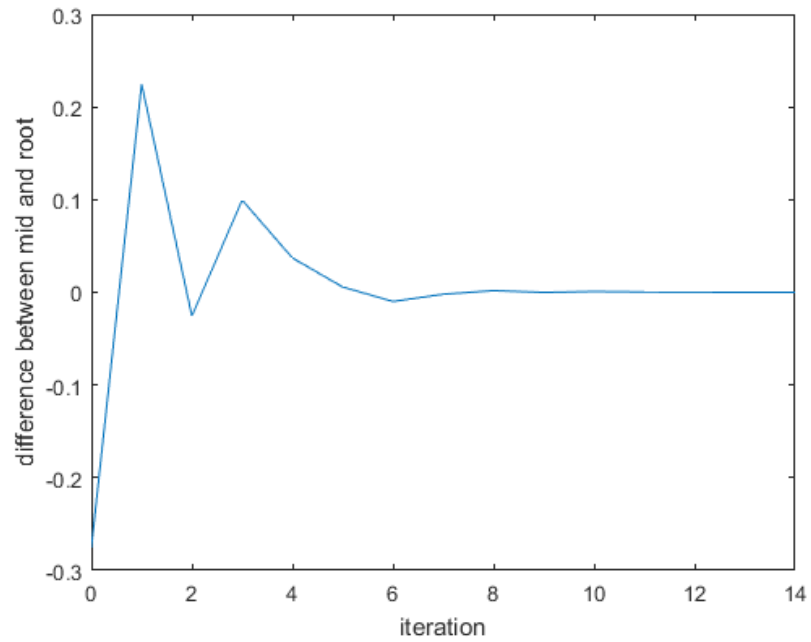
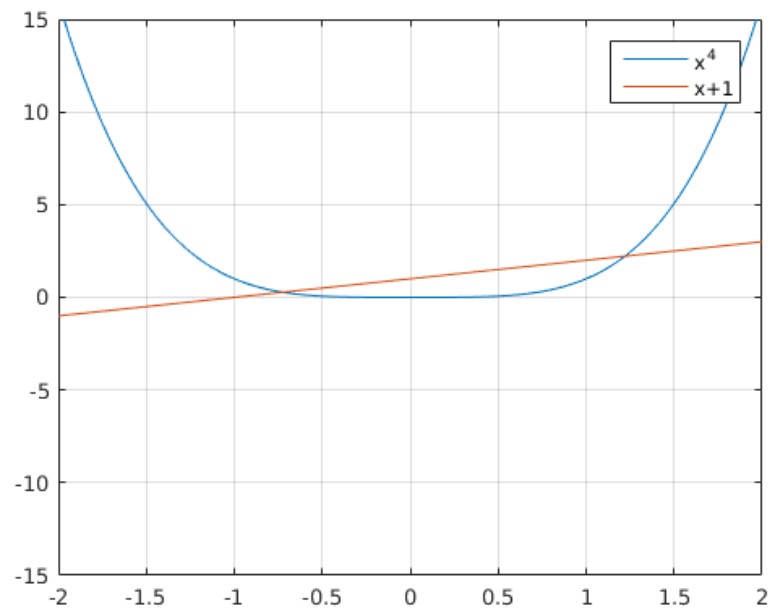


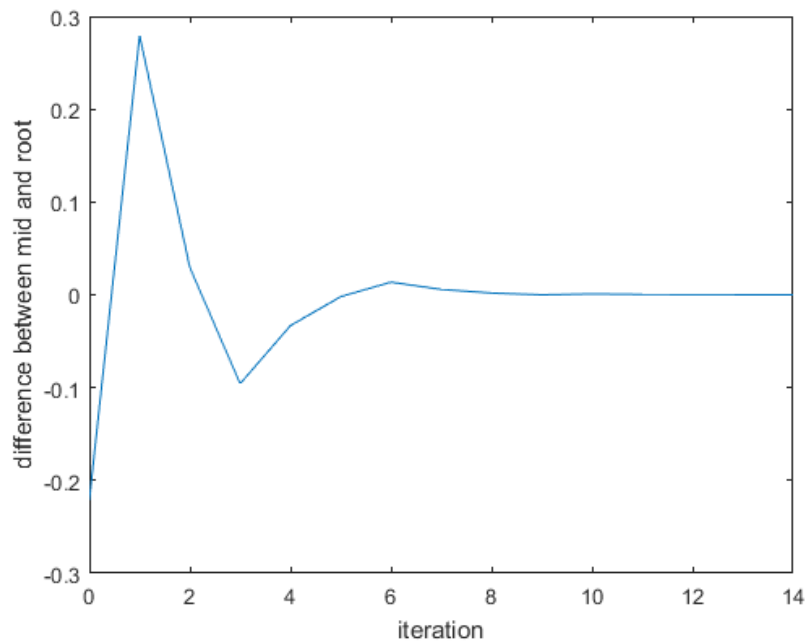
♦ **Observations:**

Root which we are getting is at $x = 1.7693$.

$$(G) \ f(x) = x^4 - x - 1 = 0$$

◆ Graphs:





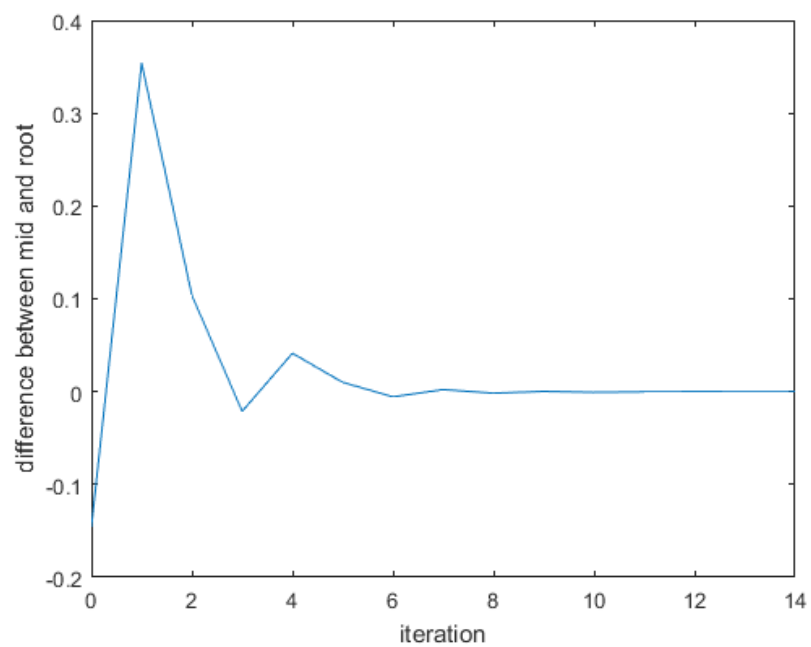
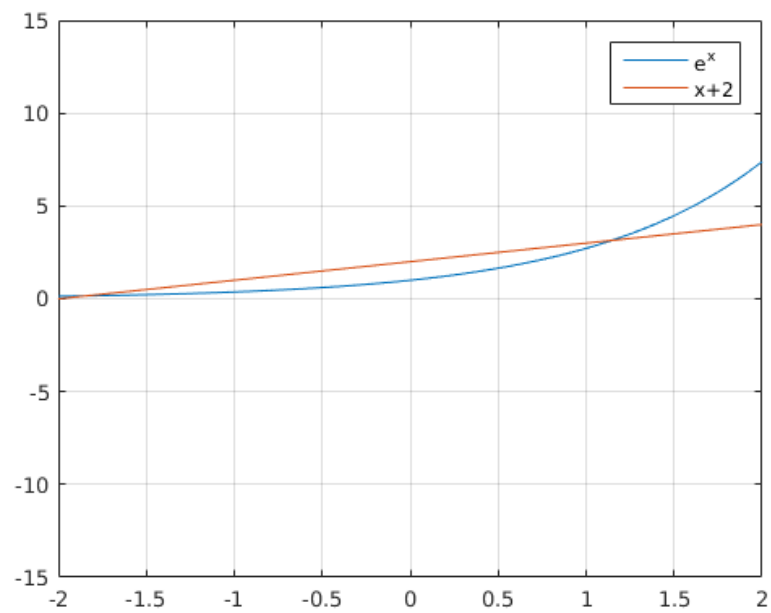
♦ **Observations:**

Smallest Root which we are getting is at $x = -0.7245$.

Largest Root which we are getting is at $x = 1.2207$.

$$(H) \ f(x) = e^x - x - 2 = 0$$

♦ **Graphs:**

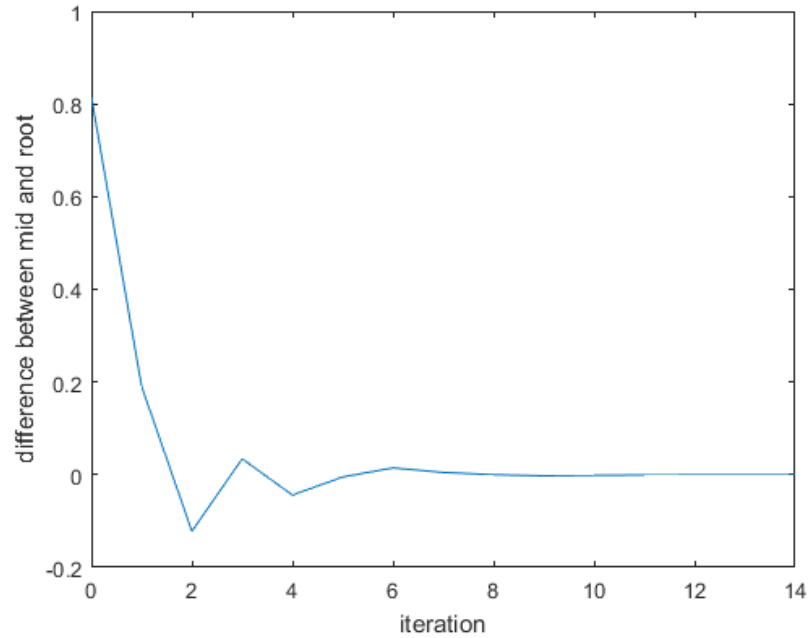
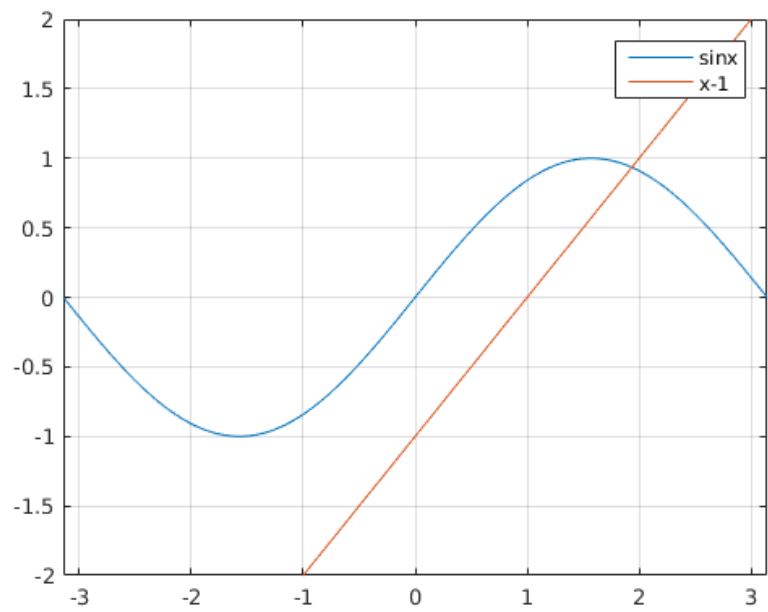


♦ **Observations:**

Root which we are getting is at $x = 1.1462$.

$$(I) \ f(x) = 1 - x + \sin x = 0$$

◆ **Graphs:**

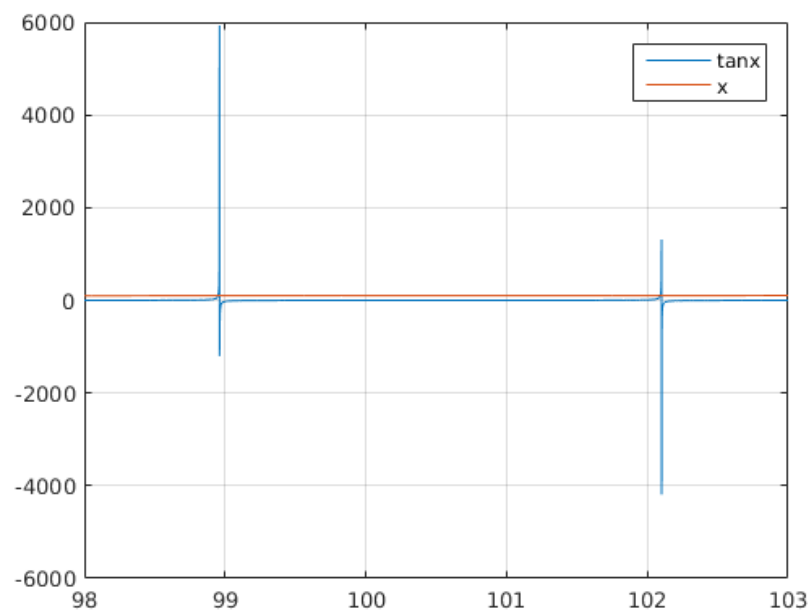
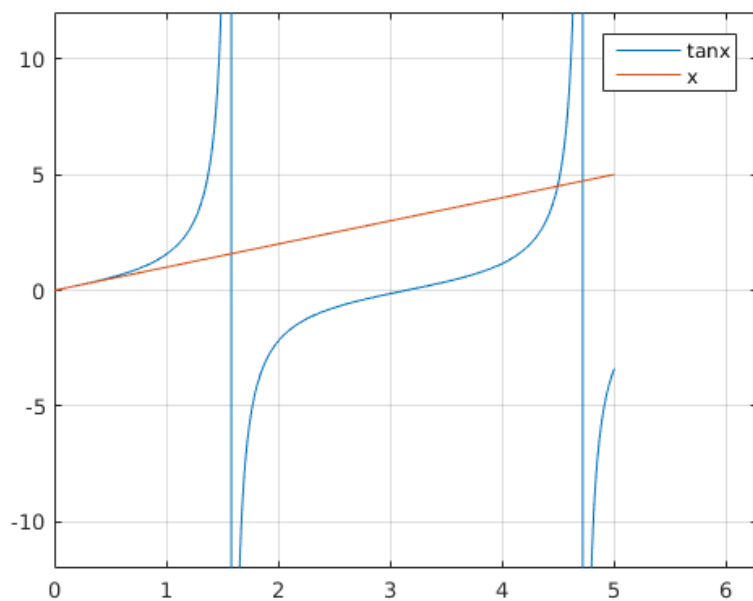


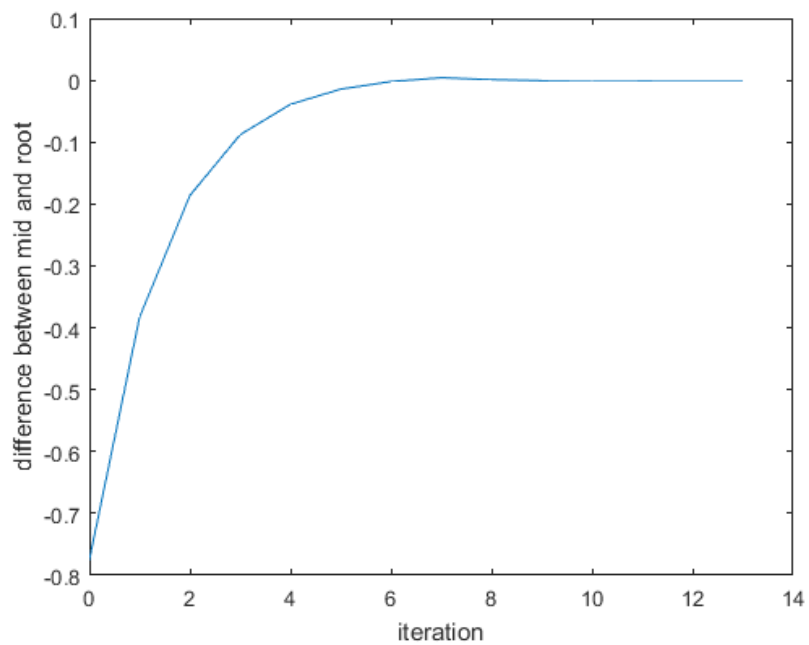
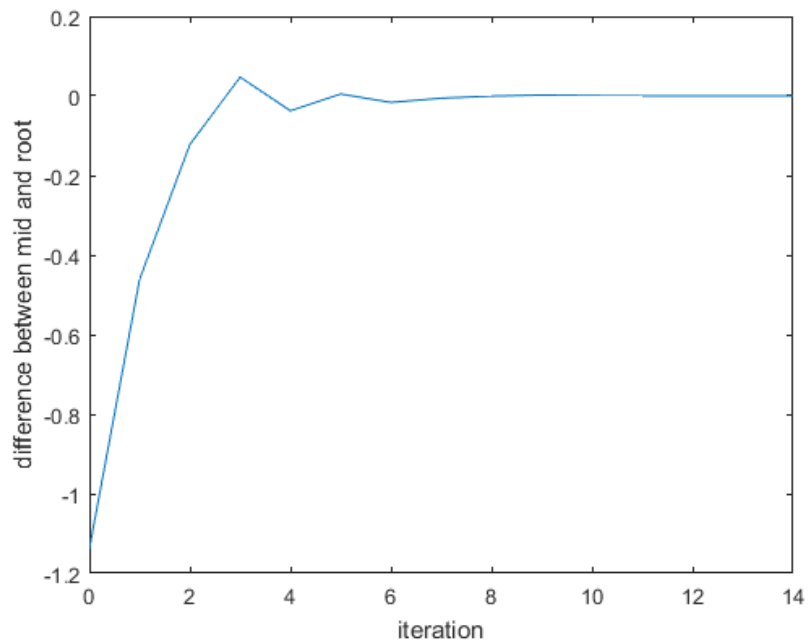
◆ **Observations:**

Root which we are getting is at $x = 1.9345$.

$$(J) \ f(x) = x - \tan x = 0$$

♦ Graphs:





◆ **Observations:**

Smallest non-zero positive Root which we are getting is at $x = 4.4934$.

Root closest to $x = 100$, which we are getting is at $x = 98.9501$.