MAT 2384-Practice Problems on fixed-point iteration, Newton's Methods and Secant method

1. Apply fixed-point iteration to find the root of $\sin x - \frac{x}{1.4} = 0$ in the interval $\left[1, \frac{\pi}{2}\right]$ to 4 decimal places. Use $x_0 = 1.4$ and make sure that the conditions for convergence of the iteration sequence are satisfied.

2. Apply fixed-point iteration to find the root of $x^4 - x + 0.2 = 0$ near $x = 0$ to 5 decimal places. Use $x_0 = 0$.

3. Apply fixed-point iteration to find the smallest positive solution of $\sin x = e^{-0.5x}$ in the interval $[0.1, 1]$ to 5 decimal places. Use $x_0 = 1$ and make sure that the conditions for convergence of the iteration sequence are satisfied.

4. Use Newton's Method (6 decimal accuracy) to solve $\sin x = \cot x$. Use $x_0 = 1$. First sketch the functions.

5. Use Newton's Method (6 decimal accuracy) to find a root of $x^3 - 5x + 3$ in the interval $[1, 2]$. Use $x_0 = 2$. First sketch the function.

6. Use Newton's Method (6 decimal accuracy) to compute $\sqrt[5]{2}$. Use $x_0 = 1$

7. Use the secant method with $x_0 = 1$, $x_1 = 0.7$ to find a solution to the equation $e^{-x} - \tan x = 0$ to 5 decimal places.