Foundation Algebra for Physical Sciences and Engineering (CELEN036)

Homework 6

1. Use the Bisection method to find x_{root} for $f(x) = \sqrt{x} - \cos x$ on $[0, 1]$. Give answer correct to 3 decimal places (d.p.).

2. Use the Bisection method to find solutions correct to 2 d.p. for $x^3 - 7x^2 + 14x - 6 = 0$ on each interval.

a. $[0, 1]$ b. $[1, 3.2]$ c. $[3.2, 4]$

3. Use the Bisection method to find solutions correct to 5 d.p. for the following problems.

a. $x - 2^{-x} = 0$, $[0, 1]$

b. $e^x - x^2 + 3x - 2 = 0$, $[0, 1]$

c. $2x \cos(2x) - (x + 1)^2 = 0$, $[-3, -2]$

d. $x \cos x - 2x^2 + 3x - 1 = 0$, $[0.2, 0.3]$

4. Use the fixed point iteration method to determine a solution correct to 2 d.p. for $x^4 - 3x^2 - 3 = 0$ on $[1, 2]$. Use $x_0 = 1$.

5. Use Intermediate Value Theorem to show that $g(x) = \pi + 0.5 \sin\left(\frac{x}{2}\right)$ has a root (unique fixed point) on $[0, 2\pi]$. Use the fixed point iteration to find an approximation to the fixed point that is accurate to within 2 decimal places.

6. Use the fixed point iteration method to find an approximation to $\sqrt{3}$ that is correct to 4 d.p.

7. Use the fixed point iteration method to determine a solution that is correct to 2 d.p. for $2 \sin(\pi x) + x = 0$ on $[1, 2]$. Use $x_0 = 1$.