

DEPARTMENT OF COMPUTER SCIENCES

CSC2912 – Numerical Analysis

Tutorial Sheet II

- 1) For each of the problems below, find the interval in which a unique solution could be found.
 - a) $3x - e^x = 0$
 - b) $2x + 3 \cos x - ex = 0$
 - c) $x^2 - 4x + 4 - \ln x = 0$
- 2) For the intervals above, estimate the solution of the equations to 10^{-4} accuracy using
 - a) Bisection method
 - b) Newton's method
 - c) Secant method
- 3) Let g be a function defined by $g(x) = 1 + 1/(x + 1)$,
 - a) Show that the fixed point of g is the root of $f(x) = x^2 - 2$
 - b) Prove that g has a unique fixed point in $[1, 2]$.
 - c) Hence use the fixed point iteration to approximate $\sqrt{2}$ to 10^{-4} accuracy.
 - d) In how many iterations was the accuracy achieved?
 - e) How many iterations are required by the Bisection method to achieve this accuracy on the same interval?
 - f) Apply the Newton's method on the same problem
- 4)
 - a) Show that the iteration equation for the Secant method can be written in the simpler form
$$p_n = \frac{f(p_{n-1})p_{n-2} - f(p_{n-2})p_{n-1}}{f(p_{n-1}) - f(p_{n-2})}$$
- 5) Why would this formula be less desirable to use in the implementation of the Secant method computer program?