

CMA6134 - Tutorial 2

Show your calculations correct to SIX decimal places.

1. How many steps of Bisection method are required if the tolerance is 10^{-4} when the initial interval is $[a,b]$.
2. By using the Bisection method, find the root for the following:
 - (a) $f(x) = e^x - 3x$, $[0.60, 0.65]$, with tolerance 1×10^{-3} .
 - (b) $f(x) = 2x^3 + 3x^2 - 3x - 5$, $[1, 2]$, with tolerance 1×10^{-3} .
 - (c) $f(x) = \sin x - 0.75$, $[0.8, 0.9]$, with tolerance 1×10^{-3} .
3. By using the Secant method, find the root for the following:
 - (a) $f(x) = x^2 - 2x - 1$, $[2.5, 2.6]$, with tolerance 1×10^{-3} .
 - (b) $f(x) = 2x^3 + 3x^2 - 3x - 5$, $[1, 2]$, with tolerance 1×10^{-3} .
 - (c) $f(x) = \sin x - 0.75$, $[0.8, 0.9]$, with tolerance 1×10^{-3} .
4. By using the Newton's method, find the root for the following:
 - (a) $f(x) = e^{-x} - \cos x$, $p_0 = 1.6$, with tolerance 1×10^{-3} .
 - (b) $f(x) = 2x^3 + 3x^2 - 3x - 5$, $p_0 = 2$, with tolerance 1×10^{-3} .
 - (c) $f(x) = \sin x - 0.75$, $p_0 = 0.9$, with tolerance 1×10^{-3} .
5. Estimate the error e_{n+1} in terms of the previous error e_n as Newton's Method converges to the given roots. Is the convergence linear or quadratic?
 - (a) $x^5 - 2x^4 + 2x^2 - x = 0$; $r = -1$, $r = 0$, $r = 1$
 - (b) $2x^4 - 5x^3 + 3x^2 + x - 1 = 0$; $r = -\frac{1}{2}$, $r = 1$