

Homework 1

1. Consider the polynomial $f(x) = x^3 - x^2 - 1$.
 - (a) Prove that $f(x)$ has exactly one real root.
 - (b) Use the *chord method* (also known as *false position method*) to find the real root of $f(x)$, correct to three decimal places.
2. Prove that the line $y = x$ and the curve $y = e^{-x}$ has exactly one intersection.
3. Use the *chord method* to find the coordinates of the intersection in Problem 2, correct to two decimal places.
4. Prove that the equation $x^2 = \frac{1}{3}(x^3 + 1)$ has exactly three real solutions.
5. Use the *bisection method* to find the three solutions in Problem 4, correct to two decimal places.
6. Write a Matlab program to solve Problem 3.