

Test 1

Exercise 1: Newton-Raphson Method (4 Points)

To find the equilibrium position of a mechanical system, we need to solve the following equation:

$$f(x) = x^3 - 2x - 5 = 0$$

1. Verify the convergence conditions for the Newton-Raphson method near $[2; 3]$.
2. Perform **two iterations** (x_1, x_2) using the Newton-Raphson formula starting from $x_0 = 3$.
3. Calculate the approximation error $|x_2 - x_1|$.

Exercise 2: Lagrange Interpolation (6 Points)

A laboratory test was conducted to measure the concrete strength (in MPa) over time (in days). The data is provided in the table below:

x (Days)	1	3	5
$f(x)$ (Strength)	10	18	24

1. Determine the **Lagrange Interpolating Polynomial** $P_2(x)$ that fits the given data points.
2. Estimate the concrete strength at $x = 4$ days using the obtained polynomial.

Good Luck