

9 The equation $x^3 - x^2 - 5x + 10 = 0$ has exactly one real root α .

(a) Show that the Newton-Raphson iterative formula for finding this root can be written as

$$x_{n+1} = \frac{2x_n^3 - x_n^2 - 10}{3x_n^2 - 2x_n - 5}. \quad [3]$$

(b) Apply the iterative formula in part (a) with initial value $x_1 = -3$ to find x_2, x_3, x_4 correct to 4 significant figures. [1]

(c) Use a change of sign method to show that $\alpha = -2.533$ is correct to 4 significant figures. [3]

(d) Explain why the Newton-Raphson method with initial value $x_1 = -1$ would not converge to α . [2]