

Question 2

Use Newton's Method to approximate the root of the equation

$$x^3 - 2x - 5 = 0$$

starting with the initial guess $x_1 = 2$. Perform three iterations to compute x_2 , x_3 , and x_4 . Round your answers to four decimal places.

Question 2 - Solution

Newton's iteration is

$$x_{n+1} = x_n - \frac{f(x_n)}{f'(x_n)}, \quad f(x) = x^3 - 2x - 5, \quad f'(x) = 3x^2 - 2.$$

Keeping full precision internally gives

$$x_2 = 2.0000000000 - \frac{-1.0000000000}{10.0000000000} \approx \boxed{2.1000}$$

$$x_3 = 2.1000000000 - \frac{0.0610000000}{11.2300000000} \approx \boxed{2.0946}$$

$$x_4 = 2.0945681211 - \frac{0.0001857232}{11.1616468418} \approx \boxed{2.0946}$$