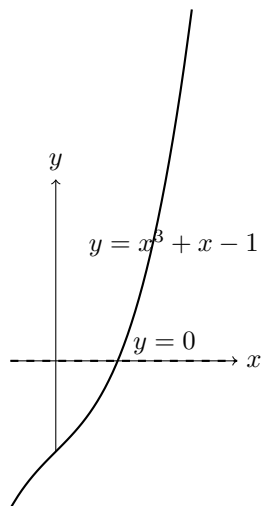


Question 9

Approximate a solution to the equation:

$$x^3 + x - 1 = 0$$

using Newton's Method. Start with $x_1 = 0.5$, and compute x_2 , x_3 , and x_4 , rounding each to four decimal places.



Question 9 - Solution

Newton's iteration is

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

Keeping full precision internally gives

$$x_2 = 0.5000000000 - \frac{-0.3750000000}{1.7500000000} \approx \boxed{0.7143}$$

$$x_3 = 0.7142857143 - \frac{0.0787172012}{2.5306122449} \approx \boxed{0.6832}$$

$$x_4 = 0.6831797235 - \frac{0.0020432938}{2.4002036038} \approx \boxed{0.6823}$$