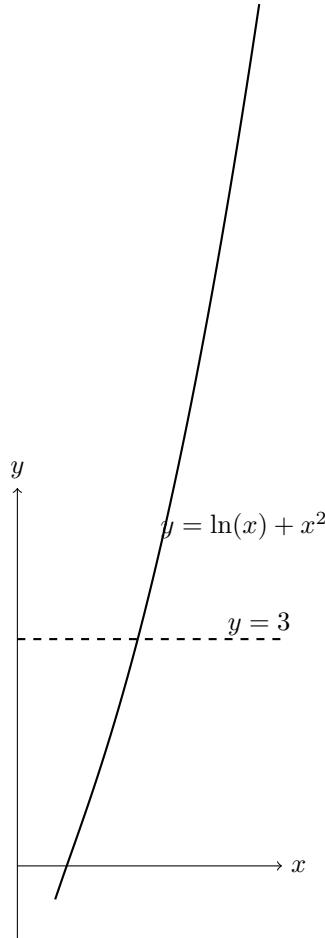


Question 7

Use Newton's Method to approximate a solution to the equation:

$$\ln(x) + x^2 = 3$$

Start with an initial guess of $x_1 = 1.5$, and compute x_2 , x_3 , and x_4 . Round each to four decimal places.



Question 7 - Solution

Newton's iteration is

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

Keeping full precision internally gives

$$x_2 = 1.5000000000 - \frac{-0.3445348919}{3.6666666667} \approx \boxed{1.5940}$$

$$x_3 = 1.5939640614 - \frac{0.0069454631}{3.8152948397} \approx \boxed{1.5921}$$

$$x_4 = 1.5921436351 - \frac{0.0000026613}{3.8123713061} \approx \boxed{1.5921}$$