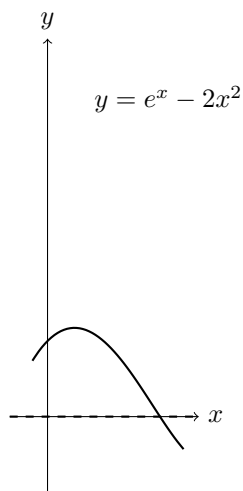


Question 8

Approximate a root of the equation:

$$e^x - 2x^2 = 0$$

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



Question 8 - Solution

Newton's iteration is

$$x_{n+1} = x_n - \frac{f(x_n)}{f'(x_n)}, \quad f(x) = e^x - 2x^2, \quad f'(x) = e^x - 4x.$$

Keeping full precision internally gives

$$x_2 = 0.5000000000 - \frac{1.1487212707}{-0.3512787293} \approx \boxed{3.7701}$$

$$x_3 = 3.7701133740 - \frac{14.9574735817}{28.3045297918} \approx \boxed{3.2417}$$

$$x_4 = 3.2416653238 - \frac{4.5594909448}{12.6096177926} \approx \boxed{2.8801}$$

These are the requested iterates; three steps do not yet give an accurate root. Continue iterating if a converged root is required.