Numerical Analysis I
Homework 2

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1. Find where the graph $y = 3x$ and $y = e^x$ intersect by using the bisection method correct to two decimal digits.

2. If the initial interval is $[0.1, 1]$, how many steps of the bisection method are needed to determine the error of a root of at most $\frac{1}{2} \times 10^{-8}$?

3. (a) Verify that when Newton's method is used to compute $\sqrt{R}$ (by solving the equation $x^2 = R$) the sequence of iterates is defined by

$$x_{n+1} = \frac{1}{2}\left(x_n + \frac{R}{x_n}\right).$$

(b) Show that if the sequence $\{x_n\}$ is defined above, then

$$x_{n+1}^2 - R = \left[\frac{x_n^2 - R}{2x_n}\right]^2.$$