1. Newton’s method can be used to compute approximately $\sqrt{3}$ by the procedure:

   - Find a function $f$ such that $x^* = \sqrt{3}$ is a root.
   - Write the iteration formula of Newton’s method.
   - Pick a point $x_0$ as the initial iteration. The closer $x_0$ is to $x^*$ the better.
   - What do you get for $x_4$?

   *See Lecture 10*
2. Find approximately the intersection point of the graph of \( u(x) = e^x \) and the graph of \( v(x) = \frac{1}{x} \) by

(a) Newton’s method (3 iterations).

(b) Bisection method (3 iterations).

We will find approximate root of

\[ f(x) = x e^x - 1. \]

(a) Use Newton’s method:

we have \( f'(x) = x e^x + e^x = (x+1)e^x \)

Pick \( x_0 = 1 \). The iteration formula is

\[ x_{n+1} = x_n - \frac{f(x_n)}{f'(x_n)} = x_n - \frac{x_n e^{x_n} - 1}{(x_n+1)e^{x_n}} \]

From here one can compute \( x_1, x_2, x_3 \).

\( x_3 = \ldots \) is the final answer.
(b) Observe that \( f'(x) = \frac{1}{2} e^{\frac{1}{2}x} - 1 < 0 \) and 
\[ f(1) = e - 1 > 0 \]

One can pick the initial interval as 
\( [a_0, b_0] = [\frac{1}{2}, 1] \).

Then find \( [a_1, b_1], [a_2, b_2], [a_3, b_3] \).

\[ c_3 = \frac{a_3 + b_3}{2} \] is the final answer.