0. *(This problem is not to be turned in.)* Section 4.12 #1

1. Read Sections 4.1–4.4. List all results and definitions from those sections that you did *not* see in your Differential Equations class.

2. Consider the following system of differential equations:
   \[
   \frac{dx}{dt} = xy - 25 \\
   \frac{dy}{dt} = x + y - 10
   \]
   (a) Is the system autonomous or non-autonomous? Linear or nonlinear?
   (b) Find all steady states.

3. Solve the following initial-value problem:
   \[
   \frac{dx}{dt} = \frac{x}{t} + e^{2t} \\
   x(1) = 3
   \]

4. Section 4.12 #9