1. Since $\pi$ is irrational, it cannot be represented as the quotient of two integers. Despite this, the quantity $\frac{22}{7}$ is sometimes used to represent $\pi$. How "good" an approximation of $\pi$ is $\frac{22}{7}$? Try to be as clear as possible about how you are measuring/defining "good".

2. Consider the function $f(x) = e^x - 3x$ and the related equation $e^x - 3x = 0$. Our goal is to understand the solutions to this equation (and hence the zeroes of the function $f(x)$). Attach additional work if necessary.

    (a) Prove that the equation $e^x - 3x = 0$ has at least one real solution. That is, there is at least one $x \in \mathbb{R}$ such that $f(x) = 0$. [Hint: Do you need to actually find a specific value for $x$?]

    (b) Determine the total number of real solutions to the equation $e^x - 3x = 0$. Justify your answer.

    (c) Comment on whether or not you are able to find any **exact** solutions to this equation.

    (d) For each solution that you are not able to find exactly, find a "good" approximation of the solution. Be as clear as you can about both how you found the approximation and how accurate your approximation is.

3. Using a Calculus textbook or reputable online sources, find and write out the following key definitions and theorems.

    (a) Continuity of a function $f(x)$ at $x = a$.                  (b) Differentiability of a function $f(x)$ at $x = a$.

    (c) Integrability of a function $f(x)$ on an interval $[a, b]$.   (d) The Intermediate Value Theorem

    (e) The Extreme Value Theorem                           (f) Rolle's Theorem

    (g) The Mean Value Theorem                            (h) Taylor's Theorem