This weightless assignment is due on Crowdmark by Monday, February 1, at 9:00pm EST. It does not count toward your course grade.

Exercise 1. Read Spivak Chapter 18, "The Logaritm and Exponential Functions."

- (a) For rational x, does Spivak first define e^x as exp(x), or does he first deduce $e^x = exp(x)$ from the definition of e and properties of exp?
- (b) True of false: exp is the only function such that f(x+y) = f(x)f(y) and f(1) = e. If true, briefly justify. If false, what extra condition on f can we impose to guarantee $f = \exp$?
- (c) A function $f: I \to \mathbb{R}$ is called *smooth* if it is C^k for every k. For example, polynomials are smooth. Is

$$f(x) := \begin{cases} e^{-\frac{1}{x^2}} & \text{if } x \neq 0\\ 0 & \text{if } x = 0 \end{cases}$$

smooth? [Extra: prove there is no polynomial $p(x) = a_n x^n + \dots + a_0$ such that p = f].