Warning: one of the tasks below is impossible.

**Problem 1.** *(a) If someone says "the function $f$ is differentiable", what does that actually mean? Be as precise as you can.*

*(b) Draw a function that is continuous but not differentiable.*

*(c) Draw a function that is differentiable but not continuous.*

*(d) Draw a negative function $f$ so that $f'$ is positive but $f''$ is negative.*

**Problem 2.** *Compute the following derivatives.*

*(a)* $f'(x)$ *for* $f(x) = \pi x + e$.

*(b)* $f''(x)$ *for* $f(x) = ax + b$.

*(c)* $f^{(2013)}$ *for* $f(x) = ax + b$.

*(d)* $f'(0)$ *for* $f(x) = x^2 \sin(1/x)$.

**Problem 3.** *(Extra; won't be on a test or quiz, but still good practice.)*

*(a) Is it true that the derivative of an odd function is always even?*

*(b) Is every function that is defined for all real numbers differentiable at least somewhere?*