**Problem 1.** *Let $f$ be a function and $a$ a point.*

*(a) Define "derivative of $f$ at $a$" using* only *words.*

*(b) Define "derivative of $f$ at $a$" using* only *symbols.*

*(c) Illustrate "derivative of $f$ at $a$" using a picture (and explain the picture).*

*(d) What is the notation for the derivative of $f$ at $a$?*

**Problem 2.** *Compute the derivative of $f(x) = \pi x + e$ at $a = 7$.*

**Problem 3.** *Suppose $f$ is a linear function with slope $m$, and $a$ is some number. What is the derivative of $f$ at $a$? (Don't just use your intuition. Show me the calculation.)*

**Problem 4.** *Suppose you're 10 miles north of Urbana, driving at $65$ miles/hour. How many miles north of Urbana do you expect to be after 10 seconds pass?*

**Problem 5.** *Suppose you know that the derivative of $\sin(x)$ at $a = \pi/3$ is $1/2$ (which is, in fact, true). Use this to extimate $\sin(1)$.*

**Problem 6.** *If a rock is thrown upward on Mars with a velocity of* 10 *m/s, its height (in meters) after t seconds is given by* $H(t) = 10t - 1.86t^2$.

*(a) Does the formula make sense (what is the position and velocity of the rock at time* $t = 0$*?*

*(b) Find the velocity of the rock after one second.*

*(c) Find the velocity of the rock at time* $t = a$.

*(d) When will the rock hit the surface? With what velocity?*