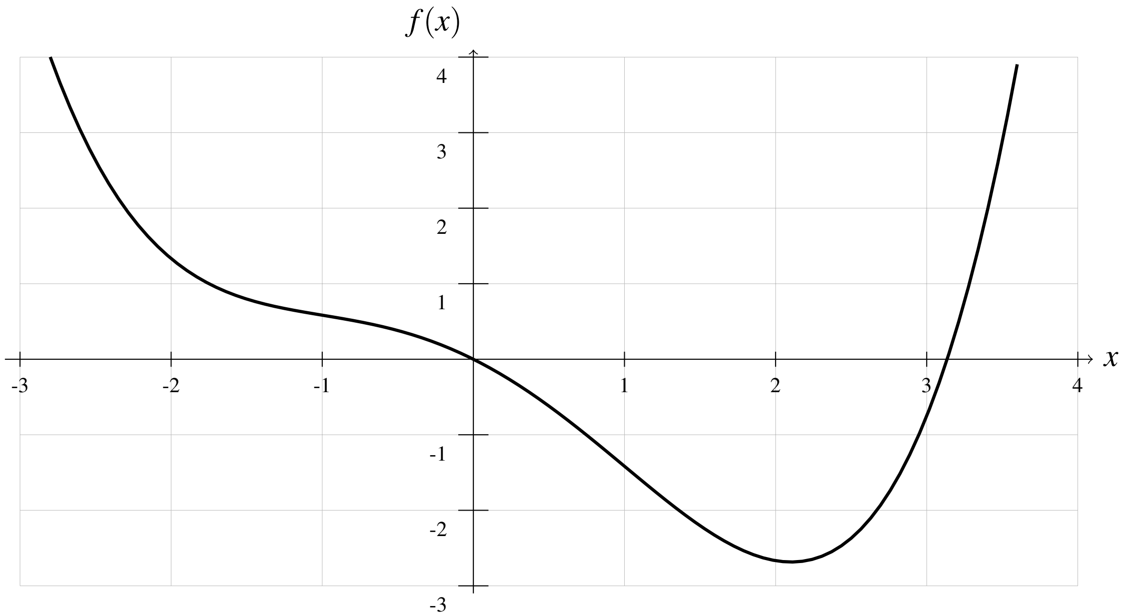
Learning target DF1, version 3

Below is a graph of the function $f(x) = \frac{x^4}{12} - \frac{x^2}{2} - x$.



(a) On the graph above, draw the tangent line to the curve at $x = -1$.

(b) On the graph above, draw a secant line that goes through the curve at $x = -1$ and at some other nearby x-value of your choice.

(c) Calculate the slope of that secant line.

(d) Use $f'(x)$ to calculate the slope of the tangent line. Compare the value you get here to the value you got in part (c). Does that make sense?

Learning target DF2, version 3

Suppose that $p(z) = -2z^3 + 5z^2 - 4z + 4$. Use the limit definition of the derivative to find $p'(z)$.

Algebra hint: $(z+h)^3 = z^3 + 3z^2h + 3zh^2 + h^3$.

Learning target DFa, version 3

Let $f(t)$ be the number of centimeters of rain that have fallen since midnight, where t is the time in hours. What do each of the following mean?
Give units to every number that you write down; **don't say "per" and don't say "rate".**

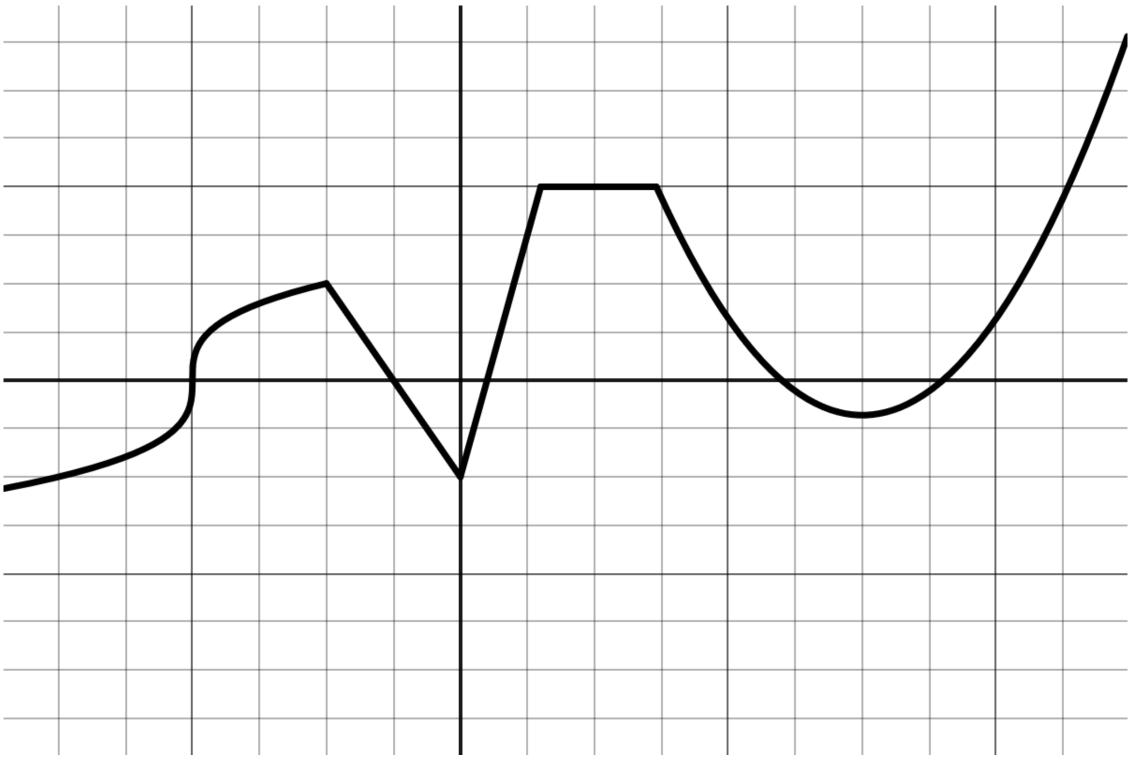
(a) $f(3) = 1.5$

(b) $f'(3) = 0.2$

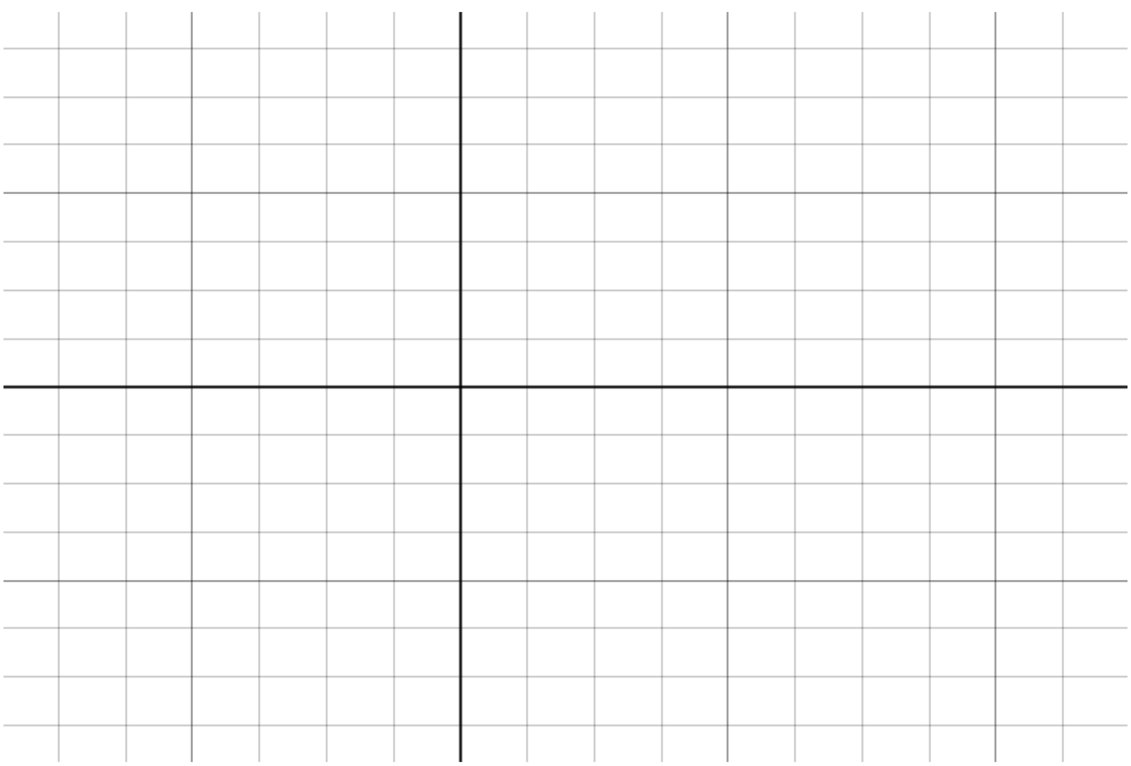
(c) Would the statement $f'(5) = -0.7$ make sense? Why or why not?

Learning target DFb, version 3

Here is the graph of some wacky function $z(x)$:



Sketch the graph of $z'(x)$ on the blank axes below.



MATH 201 Your name: ____________________

Learning target AD2, version 3

The funny thing about square roots is that most of the time, they are *irrational* numbers, which means that they can't be written as fractions, and thus their decimal expansions go on forever and never repeat. For instance, $\sqrt{67} = 8.1853527718724499699537037247339294588804868154980399630667152\text{0}$ That is clearly not a particularly useful answer to the question "what's $\sqrt{67}$?" We might in particular prefer to come up with a *fraction* that is a reasonably good approximation.

(a) The number $\sqrt{67}$ is an output y-value of the function $f(x) = \sqrt{x}$. What's the corresponding input x-value?

(b) Think of an x-value that's close to the input value you said in part (a), but for which it is *easy* to figure out the square root.

$f(\_\_\_\_) = \sqrt{} = \_\_\_\_$

(c) Compute $f'(x)$ and plug in your easy x-value. Leave your answer as a fraction.

$f'(\_\_\_\_) = \_\_\_\_$

(d) Write down the equation for the tangent line to $f(x)$ at the easy x-value.

$L(x) =$

(e) Lastly but not leastly, plug in the hard x-value into the equation for the tangent line. Leave your answer as a fraction.