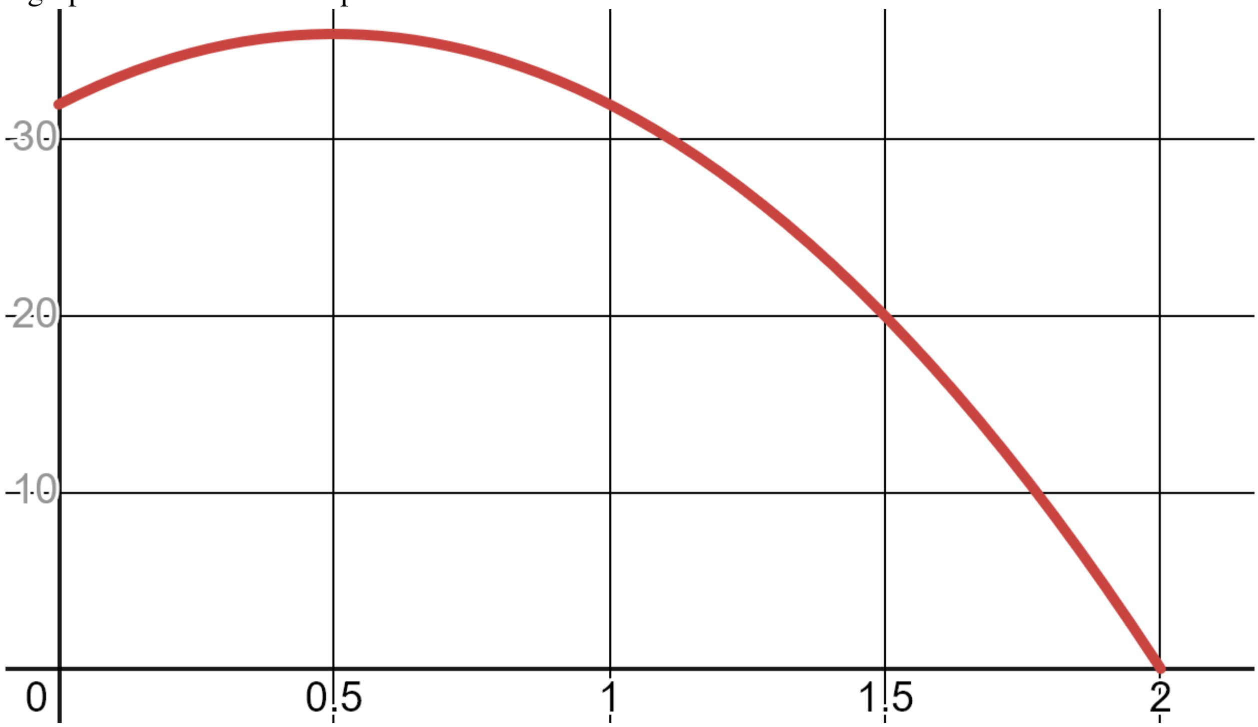
MATH 201 Your name: ____________________

Learning target DF1, version 4

A water balloon is tossed vertically in the air from a window. The balloon's height (measured in feet) at time t (measured in seconds after being launched) is given by $s(t) = -16t^2 + 16t + 32$; a graph of this function is provided below.



(a) Compute $s(1)$. Show your work.

(b) On the graph above, carefully sketch the *tangent* line to $s(t)$ at $t = 1$.

(c) On the graph above, carefully sketch a *secant* line through the point on the graph at $t = 1$ and a second nearby point.

(d) Compute the slope of your secant line. Show your work.

Hints: rise over run; one of your two y-values is $s(1)$, which you computed in part (a).

(e) Use shortcut rules to find $s'(t)$, and compute $s'(1)$; show your work. Compare your result here to your result in part (d). Do these two numbers make sense together? Why?

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Learning target DF2, version 4

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

Learning target DFa, version 4

In order to prepare for the upcoming ski season, a local resort is making snow on some of its lower trails. The snow depth, in inches, at time t is $D(t)$, where t is the number of days we are into December (so, for instance, $t = 9$ is December 9).
Write a sentence explaining what each of these equations means about the snow depth at the resort. **Give units** to every number that you write down; **don't say "per" and don't say "rate".**

(a) $D(15) = 28$

(b) $D'(15) = 1.4$

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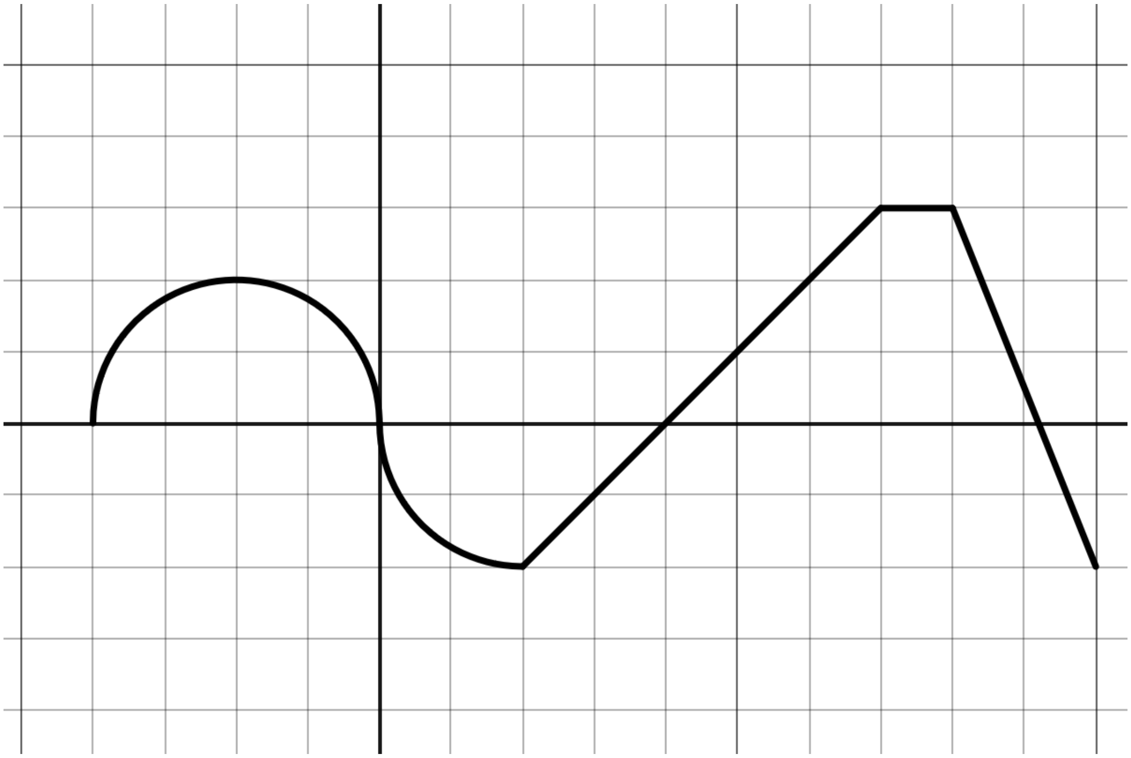
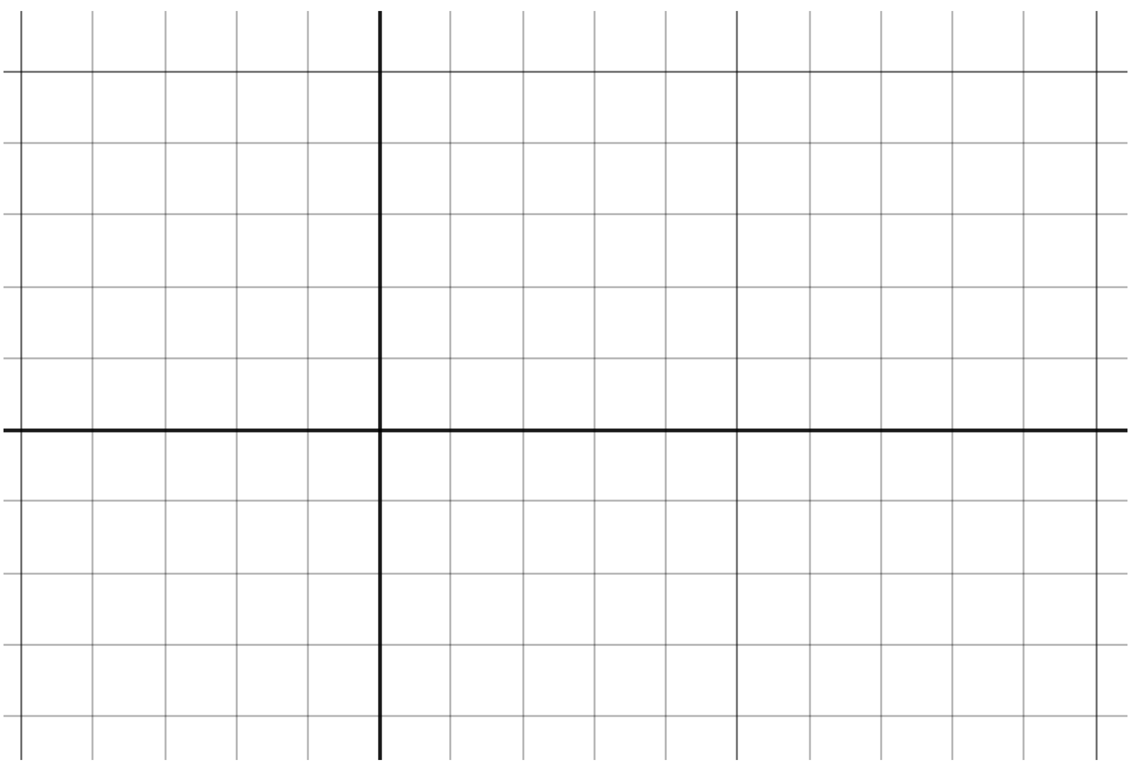
Learning target DFb, version 4

Here is the graph of some wacky function $q(t)$:

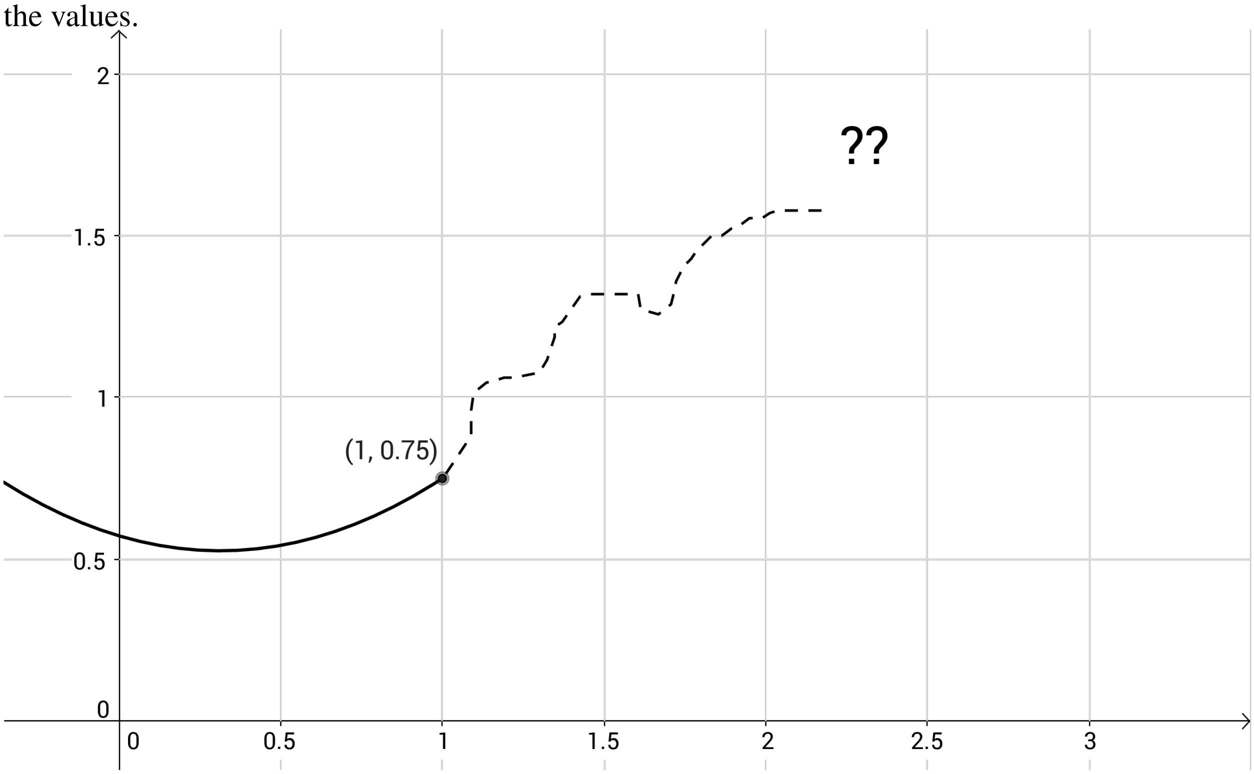


Sketch the graph of $q'(t)$ on the blank axes below.



Learning target AD2, version 4

Part of the graph of this function $f(x)$ has been erased. We'll use linear approximation to recover the values.



(a) Draw the tangent line to this function at $x = 1$.

(b) Suppose we know that $f'(1) = 0.65$. Use point-slope form to write down an equation for $L(x)$, the tangent line to this function at $x = 1$.

(c) Use your equation for $L(x)$ to estimate $f(1.4)$.

(d) Do you think it is more likely that this is an overestimate or an underestimate? How come?