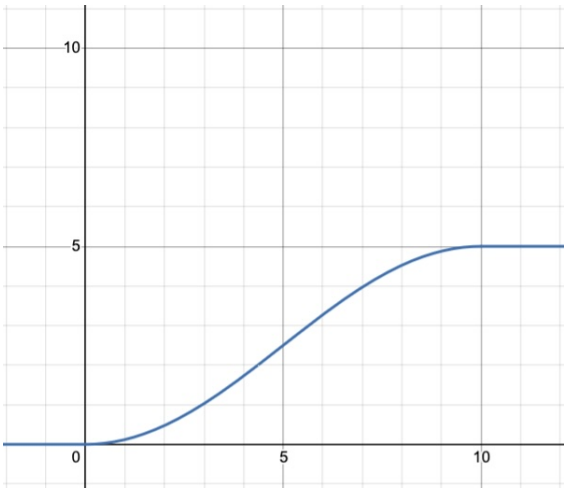
MATH 201 Your name: _____

Learning target DF0, version 1

The position (in miles), $s(t)$, of a car driving along a straight road at time t (in minutes), is given by the following graph.



1. Determine the average velocity of the car between $t = 5$ and $t = 10$ minutes, $AV_{[5,10]}$. Use proper notation and the work you did to determine the result; include units on your answer.

2. On the graph of $s(t)$ draw a line through $(3, s(3))$ and $(7, s(7))$; what is the slope of this line and what does that slope mean in the physical context of the function s?

3. Here's some additional data for the function $s(t)$ that's pictured above:

t (in minutes)	8.0	8.05	8.1	8.15
$s(t)$ (in miles)	4.52254	4.54537	4.56770	4.58952

Find the average velocity of the car on the interval $[8.05, 8.1]$. Label your result using proper notation and include units on your answer.

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Learning targets DF1 and DFa, version 2

Arapaho Glacier is a mountain glacier in Roosevelt National Forest, west of Boulder, CO. The following table[1] gives the surface area, $A(t)$, in square meters, of Arapaho Glacier in the year t.

t	1900	1960	1973	1999
$A(t)$	338,282	250,764	225,000	162,027

1. Compute an approximation for $A'(1960)$, and **include units** for this number.
   Write a sentence explaining what the number means about how the area of the glacier is changing.
   Don't say "per," and don't say "rate."

2. Compute an approximation for $A'(1999)$, and **include units** for this number.
   Do you think your approximation is too high or too low? Why?

3. How does $A'(1960)$ compare to $A'(1999)$? Is that good or bad?

[1] Haugen, B., Scambos, T., Pfeffer, T., & Anderson, R. (2010). Twentieth-century changes in the thickness and extent of Arapaho Glacier, Front Range, Colorado. *Arctic, Antarctic, and Alpine Research, 42*(2), 198-209.

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Learning target DF2, version 1

Suppose that $f(x) = 3x^2 - 5x + 4$.

1. Use the limit definition of the derivative to find $f'(x)$. **No shortcut rules!**

2. Evaluate at $x = 8$.

3. (Bonus!) What happens to the 3? What about the -5? And the 4?

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Learning target DF2, version 2

Suppose that $g(w) = 6w^3 - 2w^2 - 9w - 2$. Use the limit definition of the derivative to find $g'(w)$.

Algebra hint: $(w+h)^3 = w^3 + 3w^2h + 3wh^2 + h^3$.

PS - The answer is $g'(w) = 18w^2 - 4w + 9$.

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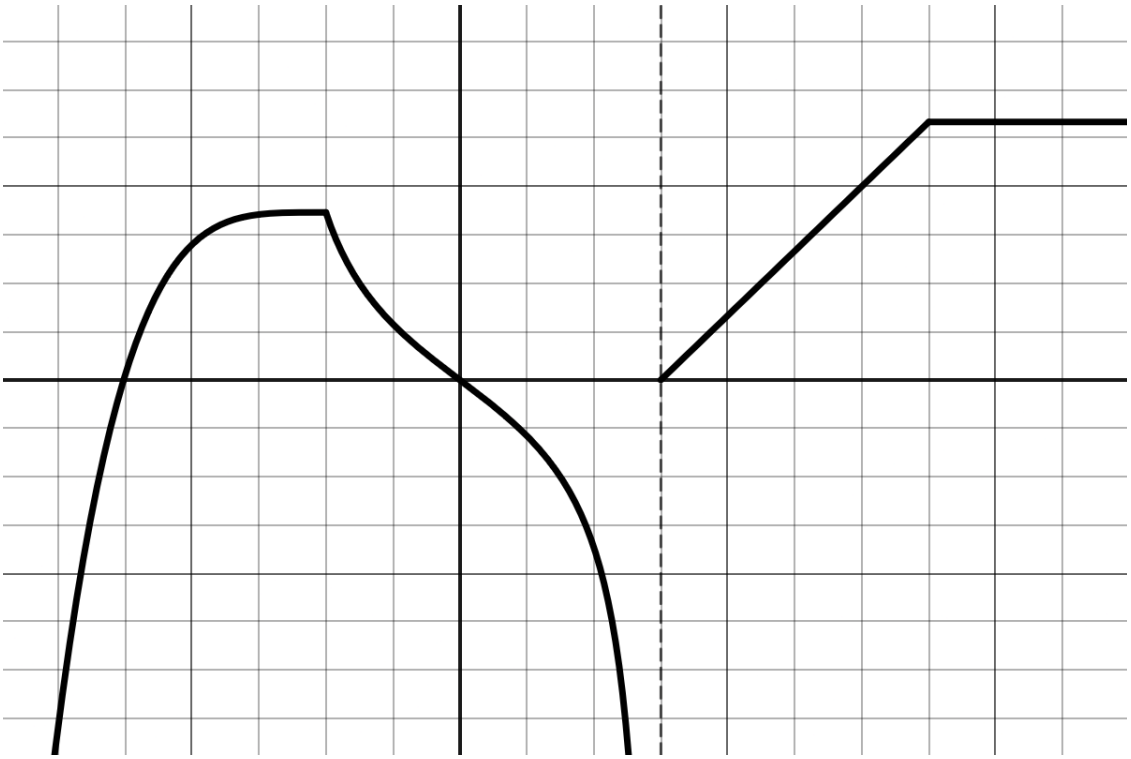
Learning target DFb, version 2

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



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