score	possible	problem
	20	1
	30	2
	30	3
	20	4
	100	

Name: _____
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Work in groups of 3 or 4. Show your work. Aknowledge any help on these specific problems.

The derivative of a function f at x is defined as

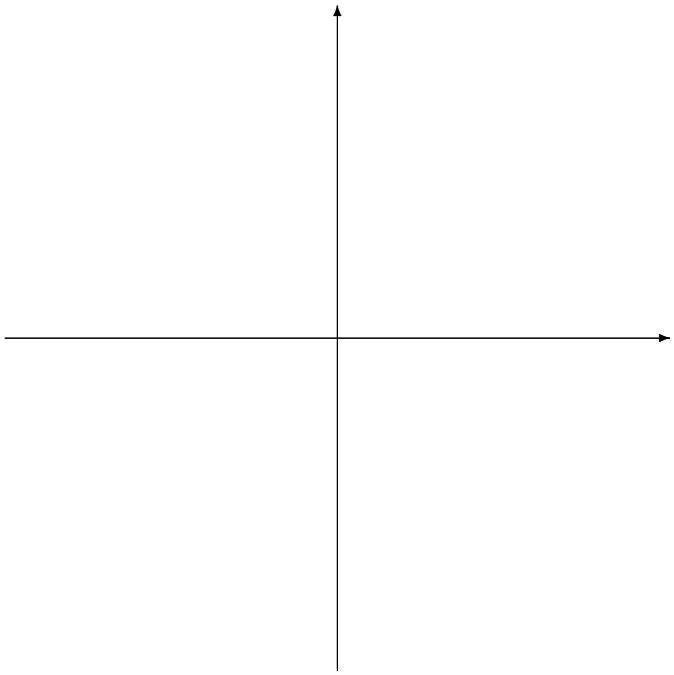
$$f'(x) = \lim_{h \to 0} \frac{f(x+h) - f(x)}{h}\,. \tag{1}$$

/10 1. (a) Let $f(x) = x^2$. Using the definition of the derivative (1), compute $f'(x)$.

/10 (b) Let $f(x) = \dfrac{2x+1}{x-5}$. Using the definition of the derivative (1), compute $f'(x)$.

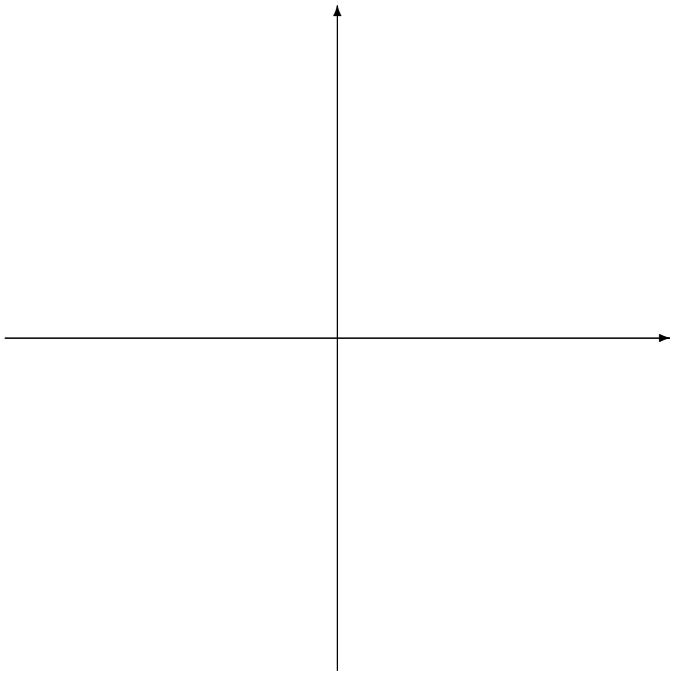
/30 2. Let $f(x) = x^2 - 3$

- Using the definition of the derivative (1), compute $f'(x)$.
- Find the equation for the tangent line at $x = 1$.
- Plot $f(x)$ and the tangent line.



/30 3. Let $f(x) = \sqrt{x}$

- Using the definition of the derivative (1), compute $f'(x)$.
- Find the equation for the tangent line at $x = 4$.
- Plot $f(x)$ and the tangent line.



/20 4. Sketch the graph of a single function f that:

- has $f(0) = f(2) = f(4) = 0$
- has $f'(1) = f'(3) = 0$
- has $f'(0) = f'(4) = 1$
- has $f'(2) = -1$
- has $\lim_{x\to\infty} f(x) = \infty$
- has $\lim_{x\to-\infty} f(x) = -\infty$