Math 263A Sections A03 and A04 (Barsamian) Class Drill 4: Representations of Slopes

In Section 2.1 of the textbook, you learned about average rate of change and instantaneous rate of change.

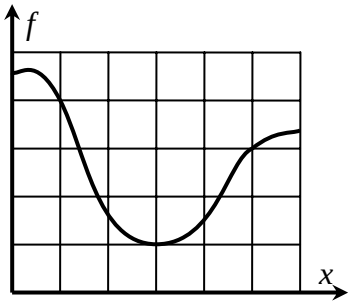
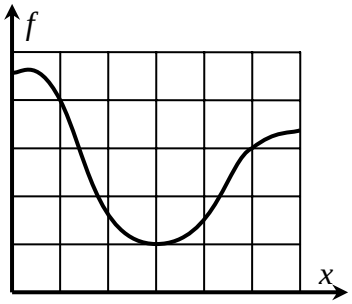
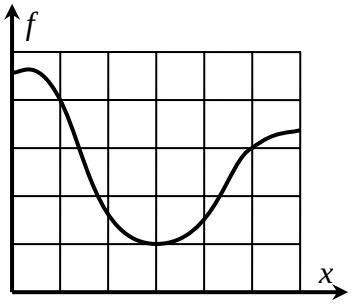
Definition of average rate of change

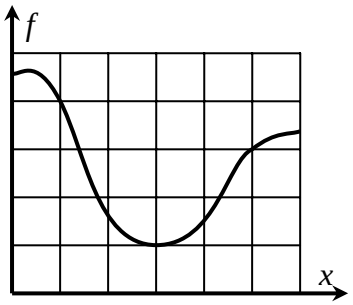
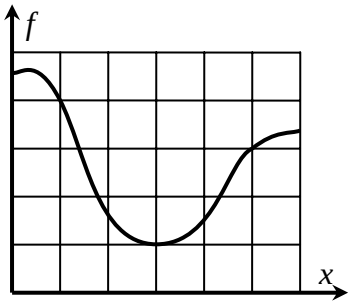
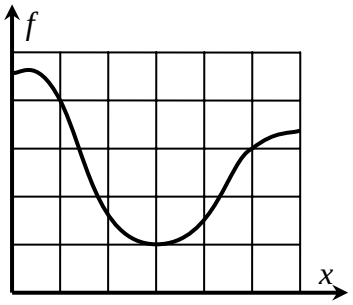
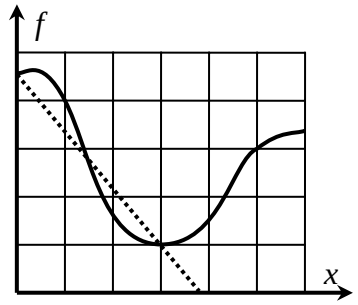
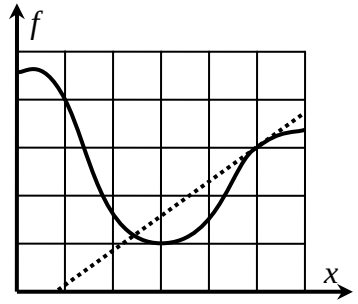
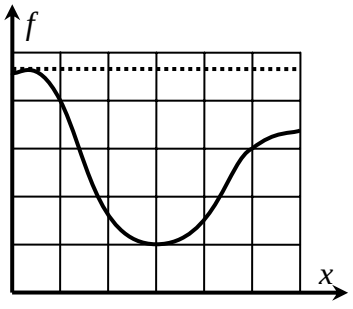
- words: the average rate of change of f with respect to x over the interval $[a,b]$.
- usage: f is a function that is continuous on the interval $[a,b]$.
- meaning: the number $m = \dfrac{f(b) - f(a)}{b - a}$
- graphical interpretation: the slope of the secant line containing points $(a, f(a))$ and $(b, f(b))$.

Definition of instantaneous rate of change

- words: the instantaneous rate of change of f at a.
- alternate words: the derivative of f at a.
- symbol: $f'(a)$
- meaning: the number $m = \lim_{h \to 0} \dfrac{f(a+h) - f(a)}{h}$
- graphical interpretation: the slope of the line tangent to the graph of f at the point $(a, f(a))$.

Each expression in the left column represents a number m that is the slope of a line on the graph of f. In each example, draw the line on the graph of f, or write the missing expression based on the line shown in the graph, and then give the value of the number m represented by the expression.

Example	Expression representing the number m	Line whose slope is the number m	The number m
(1)	the average rate of change of f as the input changes from 1 to 5		$m =$
(2)	the derivative of f at $x = 1$		$m =$
(3)	the instantaneous rate of change of f at $x = 4$		$m =$

Example	Expression representing the number m	Line whose slope is the number m	The number m
(4)	$\lim_{h\to 0}\dfrac{f(3+h)-f(3)}{h}$		$m =$
(5)	$\dfrac{f(4)-f(2)}{4-2}$		$m =$
(6)	$f'(2)$		$m =$
(7)			$m =$
(8)			$m =$
(9)			$m =$