

Math 163A Class Drill 3: Representations of Slopes

In Section 3-4 of the textbook, you learned about average rate of change and instantaneous rate of change.

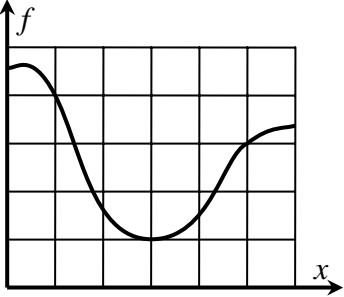
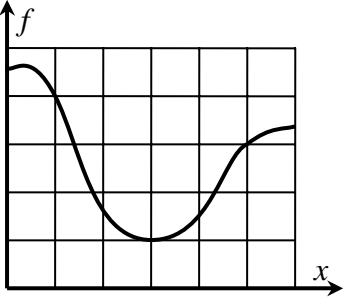
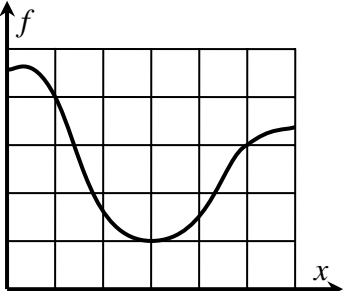
Definition of average rate of change

- words: the average rate of change of f as the input changes from a to b
- usage: f is a function that is continuous on the interval $[a,b]$.
- meaning: the number $m = \frac{f(b) - f(a)}{b - a}$
- 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 $m = \lim_{h \rightarrow 0} \frac{f(a+h) - f(a)}{h}$
- 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.

<u>Example</u>	<u>Expression representing the number m</u>	<u>Line whose slope is the number m</u>	<u>The number m</u>
(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

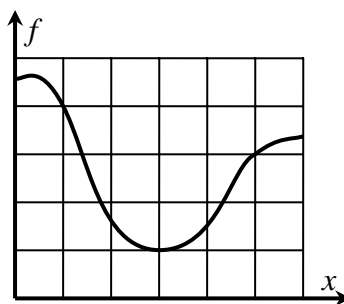
Expression representing the number m

Line whose slope is the number m

The number m

(4)

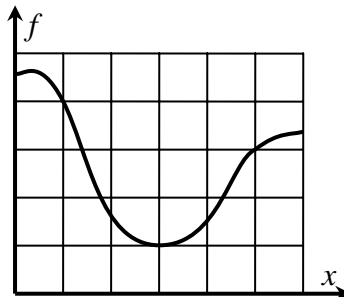
$$\lim_{h \rightarrow 0} \frac{f(3+h) - f(3)}{h}$$



$m =$

(5)

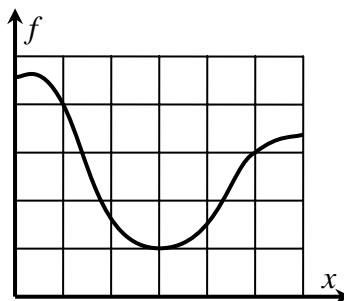
$$\frac{f(4) - f(2)}{4 - 2}$$



$m =$

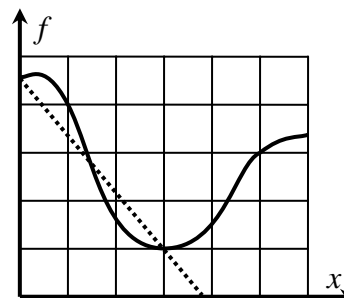
(6)

$$f'(2)$$



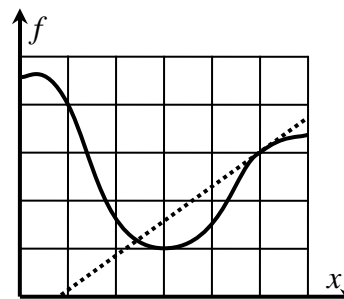
$m =$

(7)



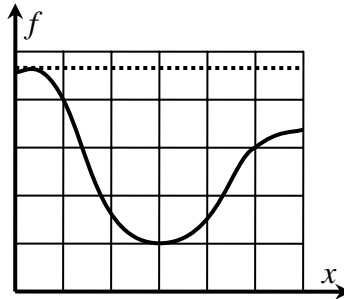
$m =$

(8)



$m =$

(9)



$m =$