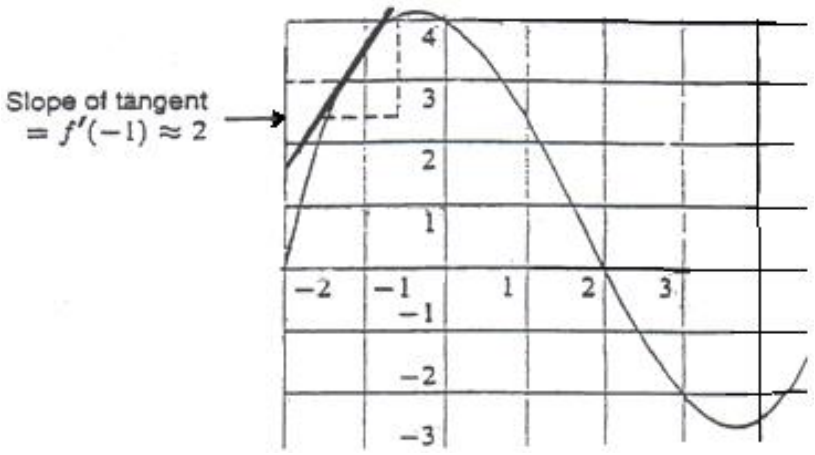
2.3 The Derivative Function--Student Notes HH6ed

The graph at the right is some function $f(x)$ with a tangent drawn to the curve at the point $x = -1$.



1. Complete the table below by indicating, for each of the specified intervals, whether the **slope** of the function is positive or negative, increasing or decreasing on the interval.

Interval	Positive/Negative	Increasing/decreasing
(-2, -0.5)		
(-0.5, 1.5)		
(1.5, 3.5)		
(3.5, 5)		

2. Using a straightedge and pencil, lightly sketch the tangents to the function and estimate the slopes of the tangents. Complete the table of values for the derivative function below.

x	-2	-1	0	1	2	3	4	5
$f'(x)$								

3. Using a colored pencil, sketch the graph of the derivative function by plotting your table values and connecting them with a smooth curve. Do this on the grid of $f(x)$.

4. Based on the graphs of $f(x)$ and its derivative $f'(x)$, answer these questions:

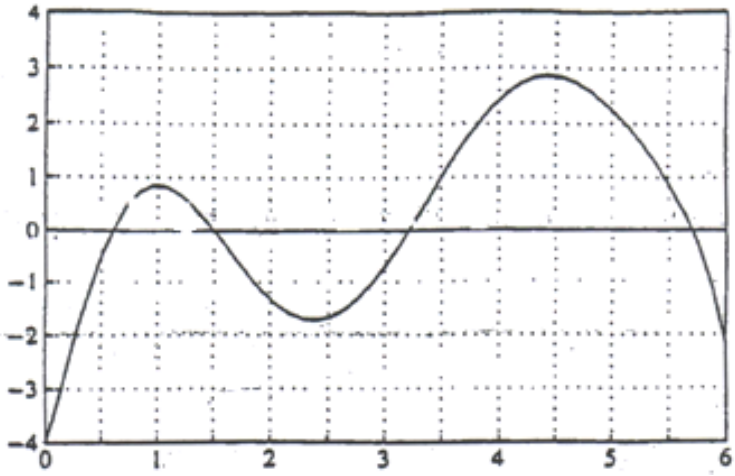
   a. When the derivative function $f'(x)$ is positive, the graph of $f(x)$ is _____

   b. When the derivative function $f'(x)$ is negative, the graph of $f(x)$ is _____

   c. When the derivative function $f'(x)$ changes sign, the graph of $f(x)$ is _____

   d. When the derivative function $f'(x)$ has a turning point, the graph of $f(x)$ is _____

5. The graph of the function f is shown below.

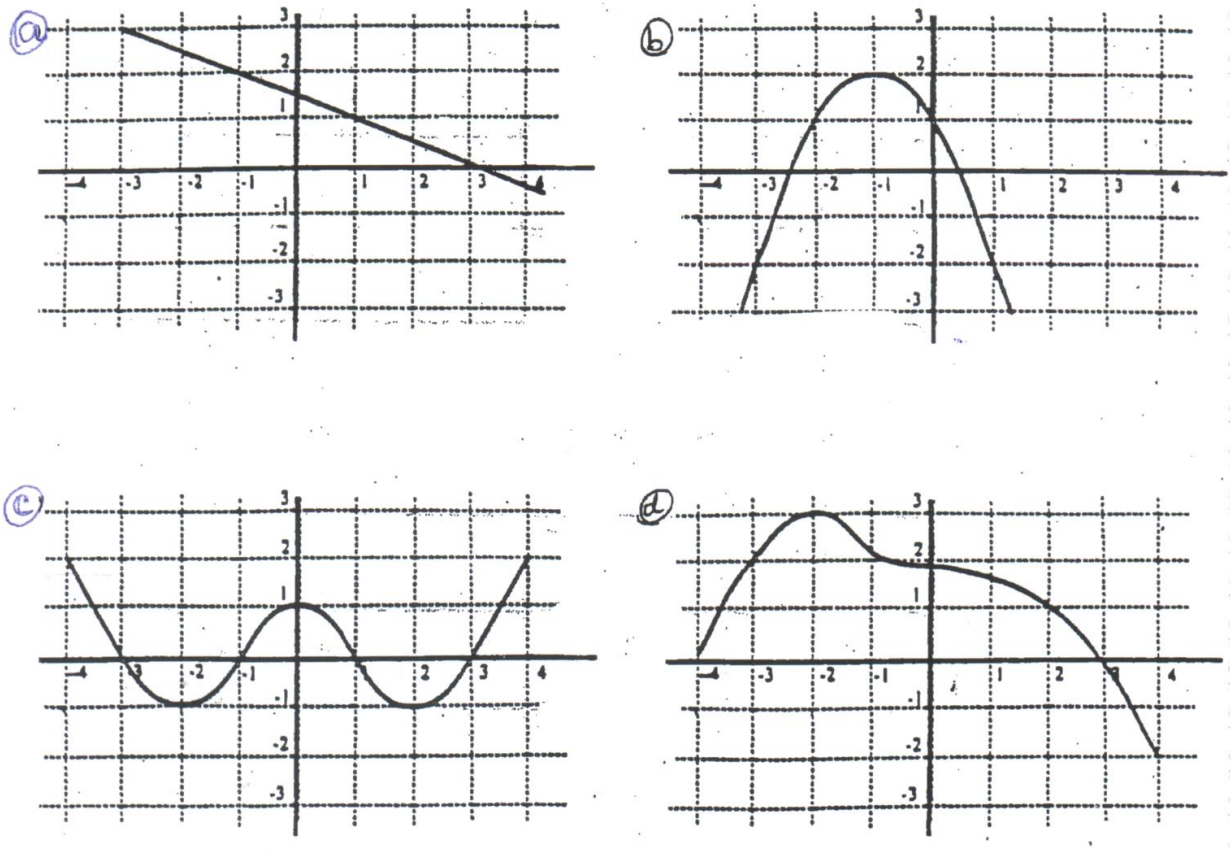


a. Complete the table below, filling in the values for $f\,'(x)$.

x	1	2	3	4	5	6
$f'(x)$						

b. Sketch a graph of $f\,'(x)$. Do this on the grid of $f(x)$.

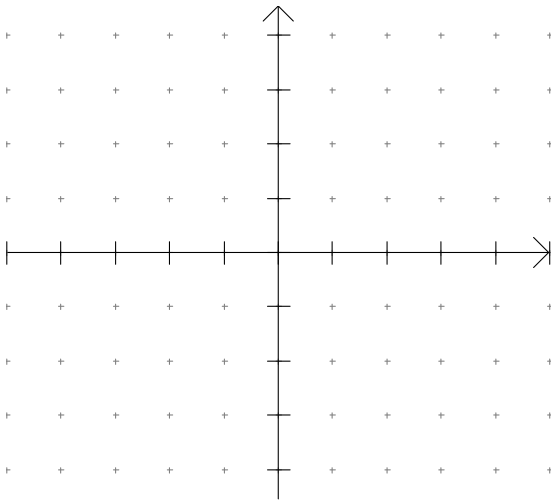
6. For each of the following, sketch a graph of the derivative function on the axes with the function. Use a colored pencil.



Practice:

1. a. Sketch the graph of a function f that is consistent with these data:

x	-2	-1	1	2
$f(x)$	1	-1	-1	2
$f\,'(x)$	-3	0	-1	-2



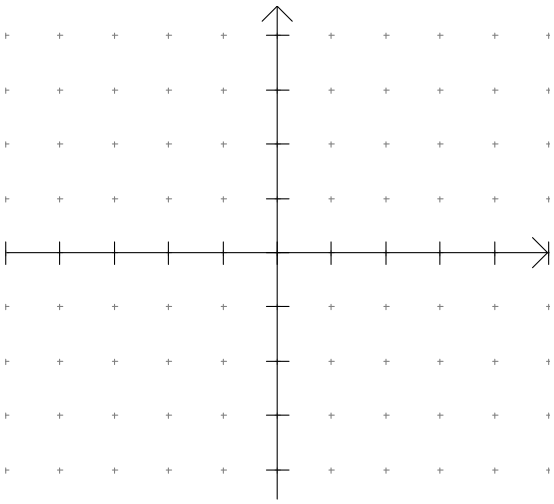
b. Write an equation for the tangent line to the function f at $x = -2$.

2. The line tangent to a function f at (5, 2) passes through the point (0, 1). Find $f(5)$ and $f\,'(5)$.

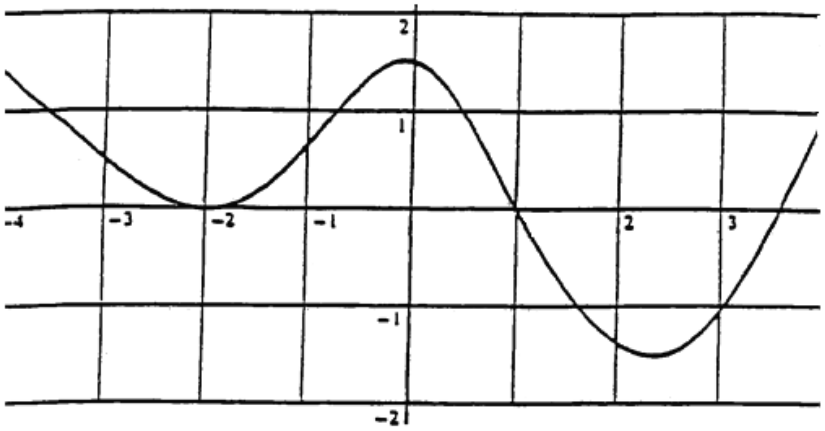
3. Suppose that $f\,'(x) \geq 0$ on the interval (2, 7). Explain why $f(3) \leq f(6)$.

4. Draw the continuous function $y = f(x)$ that satisfies the following three conditions.

- $f\,'(x) > 0$ for $x < -2$
- $f\,'(x) < 0$ for $-2 < x < 2$
- $f\,'(x) = 0$ for $x > 2$

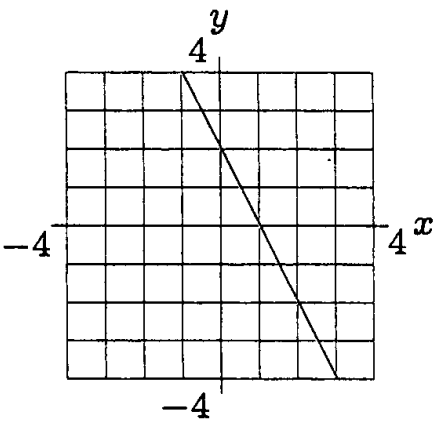


5. The graph *f* is given.
   Sketch the graph of *f* ’.



6. For exercises 1-8, sketch a graph of the derivative function of each of the given functions.

1.



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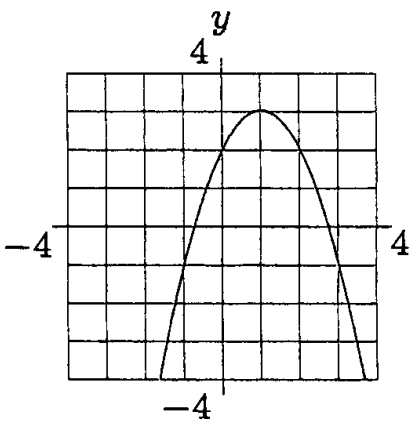

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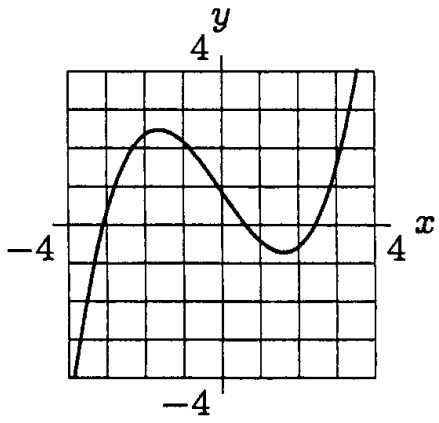

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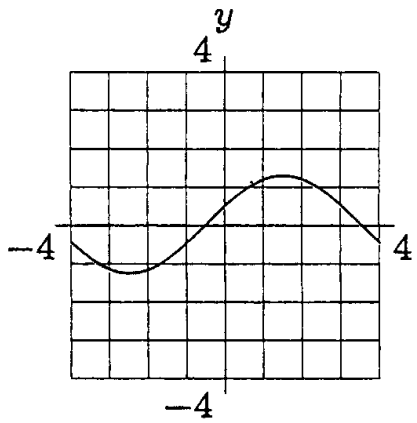

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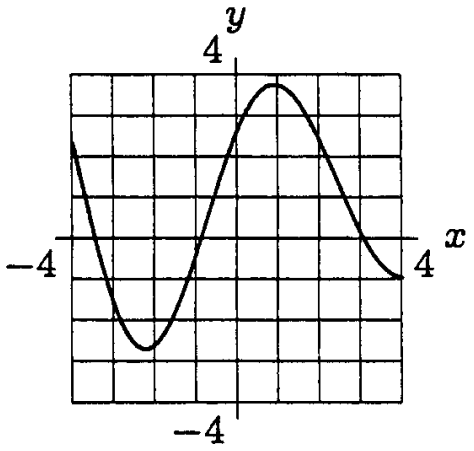

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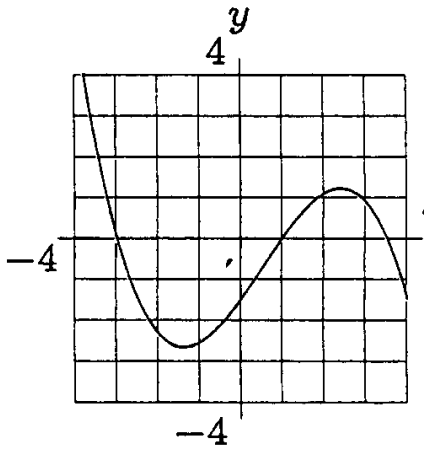

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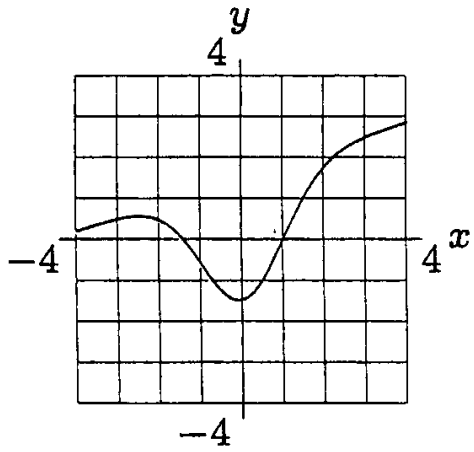

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