

Week in Review # 5

Sections 2.2, 2.3, 2.4

Things to know:

- Be able to sketch the graph of a derivative.
 - Be able to give units for the derivative and interpret a derivative.
 - Be able to use the derivative to estimate values of a function.
 - Know the relationships between the function, first derivative, and the second derivative.
 - Be able to sketch a graph of a function given information about its first and second derivatives.
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1. Fill in the blanks with the relationships between $f(x)$, $f'(x)$, and $f''(x)$.

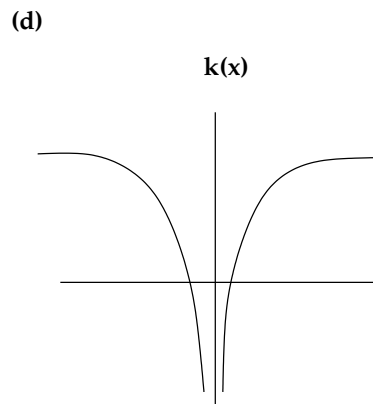
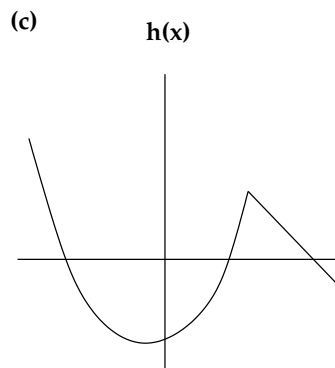
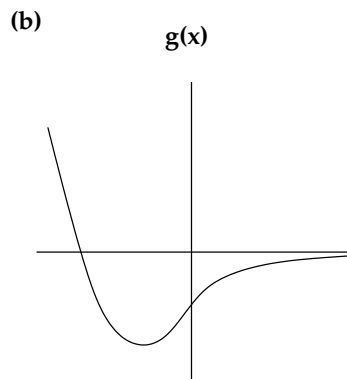
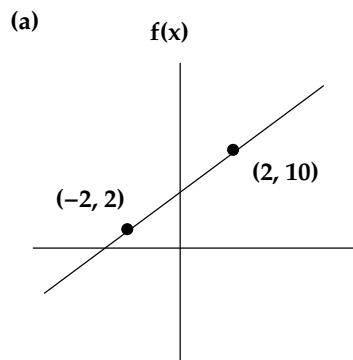
$f'(x) > 0$ means that _____

$f'(x) < 0$ means that _____

$f''(x) > 0$ means that _____ and _____

$f''(x) < 0$ means that _____ and _____

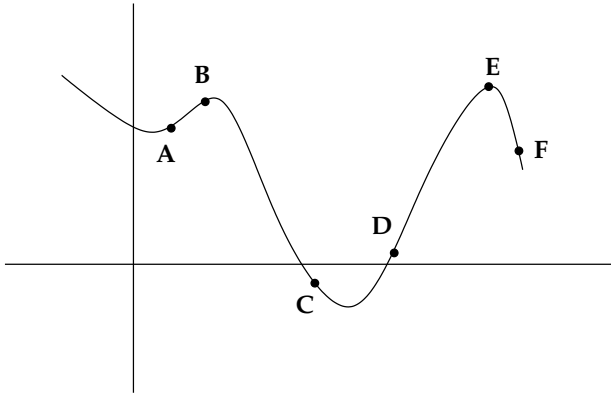
2. Sketch the graphs of the derivatives of each of these functions.



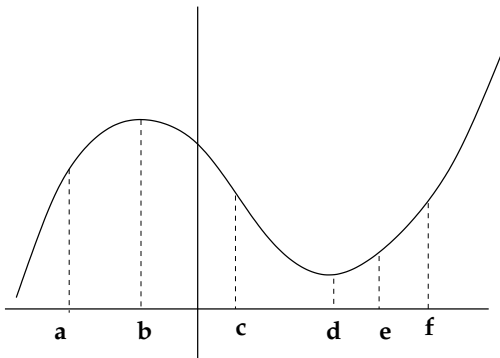
3. Here is the graph of the function $f(x)$.

(a) Arrange the derivatives at the given points from smallest to largest.

(b) At which points does $f'(x)$ and $f''(x)$ have the same sign?



4. Match the points with the derivatives.



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

5. Suppose $H = f(t)$ is the time, in minutes, that it takes a deep fryer to heat up to $t^{\circ}\text{F}$.

(a) What are the units of $f'(t)$ and what is the sign of $f'(t)$?

(b) What is the meaning of $f(350) = 15$?

(c) what is the meaning of $f'(350) = 0.25$?

(d) Estimate the time for the deep fryer to heat up to 375°F .

6. Suppose $P(t)$ is the monthly payment, in dollars, on a mortgage which will take t years to pay off.

(a) What are the units of $P'(t)$ and the sign of $P'(t)$?

(b) What is the practical meaning of $P'(t)$?

7. Suppose $g(20) = 125$ and $g'(20) = -8$. Estimate $g(18)$, $g(25)$, and $g(31)$.

8. If $f(3) = 20$, $f'(3) = 2$ and $f''(x) < 0$ for $x \geq 3$, what can you say about the value of $f(7)$?

9. The temperature inside a house was given by $f(t)$ in $^{\circ}\text{F}$. At 1pm, the temperature was 70°F . The first derivative, $f'(t)$ decreased until reaching a value of $1^{\circ}\text{F}/\text{hour}$ at 1pm, then increased for the rest of the day. sketch a graph of the temperature inside the house during this time period.

10. Sketch a graph of a function that meets these conditions.

$f(x)$ is positive for $x < 0$

$f'(x) > 0$ for $x < 3$

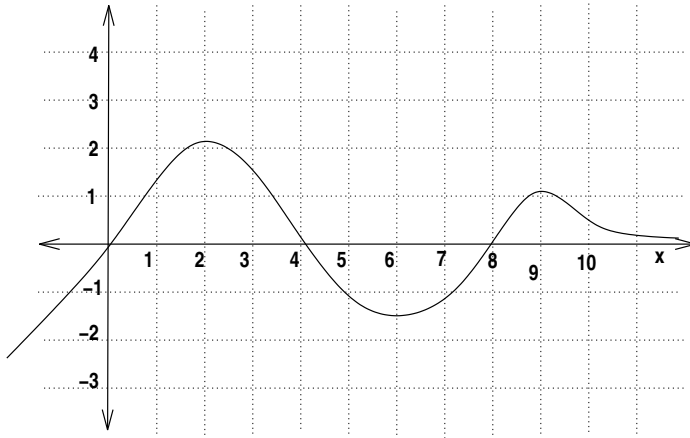
$f'(x) < 0$ for $x > 3$

$f''(x) < 0$ for $x > 0$

$f''(x) > 0$ for $x < 0$

$f'(3) = 0$

11. Here is the graph of $f'(x)$.



- (a) On what intervals is $f(x)$ increasing?
- (b) On what intervals is $f(x)$ decreasing?
- (c) On what intervals is $f(x)$ concave up?
- (d) On what intervals is $f(x)$ concave down?
- (e) Use the above information to sketch a graph of $f(x)$.