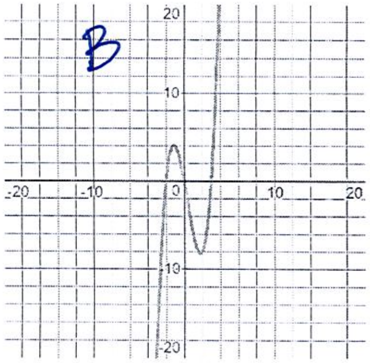
Practice Test Function Analysis with Calculus

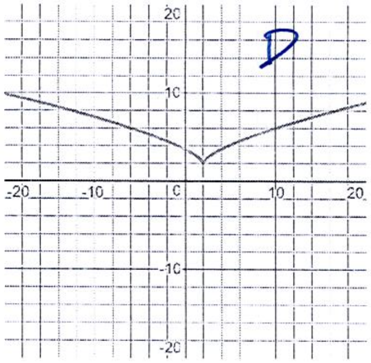
Name key

1. Match each function graph with its derivative graph.

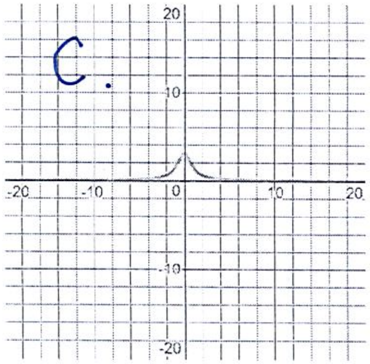
Functions:



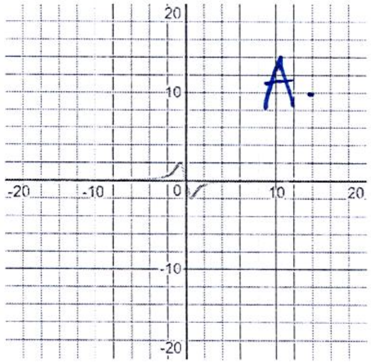
B



D



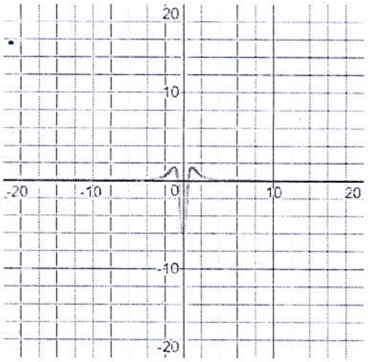
C.

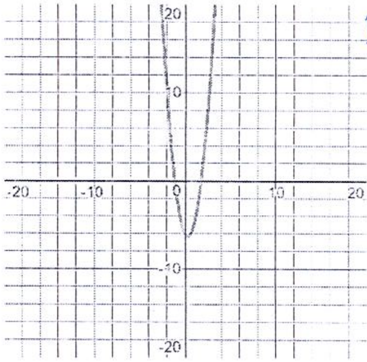


A.

Derivatives:

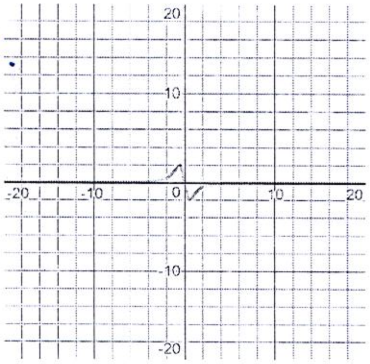
A.

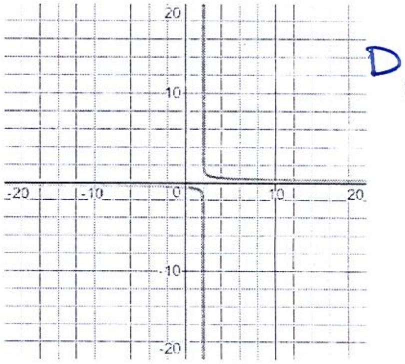




B.

C.

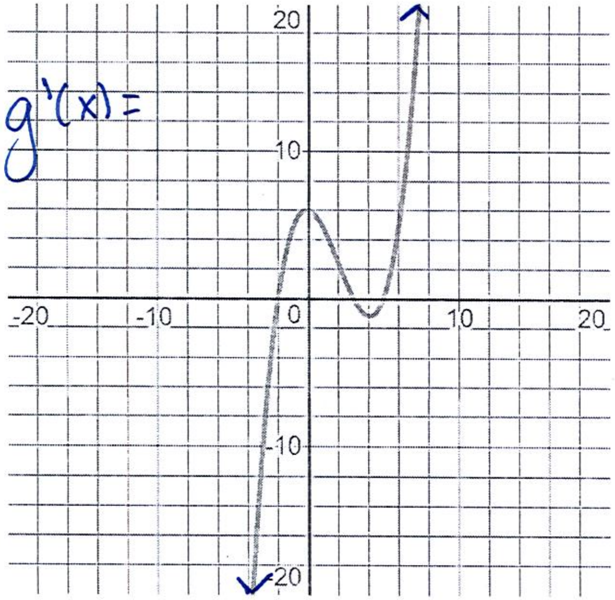


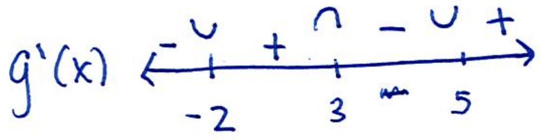


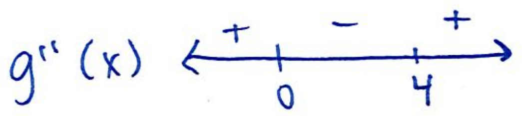
D.

Given this graph of the derivative, g'(x), fill in the table for g(x).

Characteristic	g(x)
Intervals of increase	(-2, 3) ∪ (5, ∞)
Intervals of decrease	(-∞, -2) ∪ (3, 5)
Minima	x = -2 , 5
Maxima	x = 3
Point(s) of inflection	x = 0, 4
Concave up	(-∞, 0) (4, ∞)
Concave down	(0, 4)

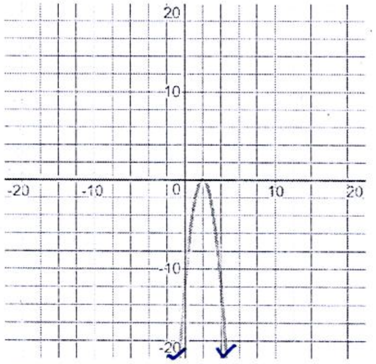




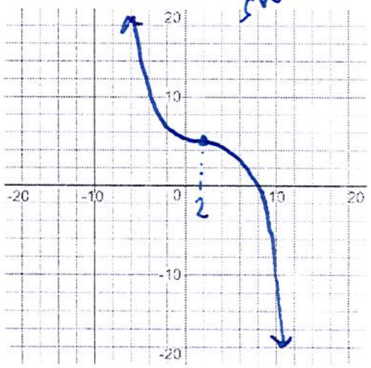


3. Use the given information to sketch the curve. Fill in the table for each problem.

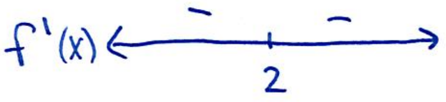
a. The graph of f'(x)...

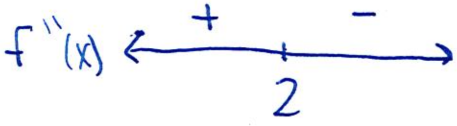


any variation w/ a vertical shift works



Characteristic	fg(x)
Intervals of increase	none
Intervals of decrease	(-∞, ∞)
Minima	none
Maxima	none
Point(s) of inflection	X = 2
Concave up	(-∞, 2)
Concave down	(2, ∞)

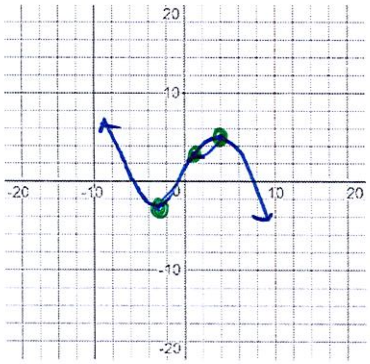


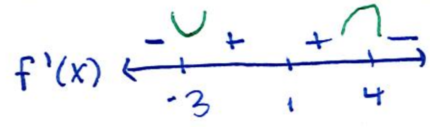


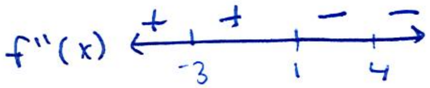
Coordinate pts of f

b. This table

X	$-\infty < x < -3$	-3	~~$-\infty < x < -3$~~ $-3<x<1$	1	~~$-\infty < x < -3$~~ $1<\infty<4$	4	~~$-\infty < x < -3$~~ $4<x<\infty$
f(x)		-3		3		5	
f′(x)	Negative	0	Positive		Positive	0	negative
f″(x)	Positive		Positive	0	Negative		negative

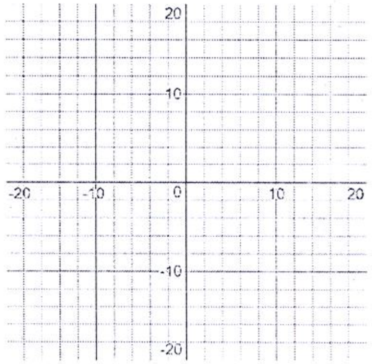






Characteristic	f(x)
Intervals of increase	$(-3, 4)$
Intervals of decrease	$(-\infty, -3) \cup (4, \infty)$
Minima	$x=-3$ relative min
Maxima	$x=4$ relative max
Point(s) of inflection	$x=1$
Concave up	$(-\infty, 1)$
Concave down	$(1, \infty)$

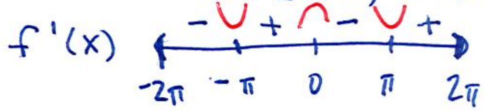
c. This function: $f(x) = 3\cos(x)$ $[-2\pi, 2\pi]$



$f'(x) = -3\sin x$ ~~$[-2\pi, 2\pi]$~~

$\sin x = 0$

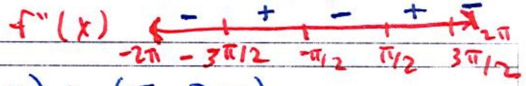
$x = \pm 2\pi, \pm\pi, 0$



$f''(x) = -3\cos x = 0/\text{DNE}$

$\cos x = 0$

$x = \pm\pi/2, \pm 3\pi/2$



Characteristic	f(x)
Intervals of increase	$(-\pi, 0) \cup (\pi, 2\pi)$
Intervals of decrease	$(-2\pi, -\pi) \cup (0, \pi)$
Minima	$x = -\pi$ $x = \pi$
Maxima	$x = -2\pi$ $x = 0$ $x = 2\pi$
Point(s) of inflection	$x = -3\pi/2, -\pi/2, \pi/2, 3\pi/2$
Concave up	$(-3\pi/2, -\pi/2) \cup (\pi/2, 3\pi/2)$
Concave down	$(-2\pi, -3\pi/2) \cup (-\pi/2, \pi/2) \cup (3\pi/2, 2\pi)$

4. Find the absolute maximum and absolute minimum of the function on the given interval.

a. $f(x) = -x^2 + 6x - 7$ $[0, 5]$

$f' = -2x + 6 = 0$

$x = 3$

$f(0) = -7$

$f(5) = -2$

abs max: x=3

abs min: x=0

b. $y = -x^3 - 6x^2 - 9x + 3$ $[-3, 0]$

$y' = -3x^2 - 12x - 9 = 0$

$-3(x^2 + 4 + 3) = 0$

$-3(x+3)(x+1) = 0$

$x = -3, -1$

$f(-3) = 3$

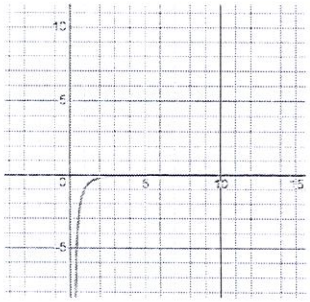
$f(0) = 3$

abs. max: x=-

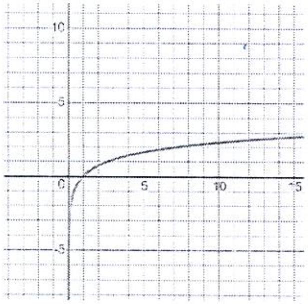
asb. min:

X=-3+0

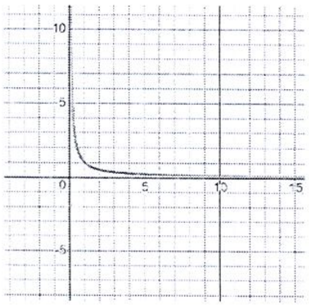
5. These three graphs are a function, its first derivative and its second derivative. Figure out which one is which.



f''



f



f'

Fill in the blanks.

6. When the second derivative is negative the function is Concave up.

7. When the derivative is increasing, the second derivative is positive.

8. When the derivative is negative the function is decreasing.

9. When the function has a local maximum, the derivative changes from Pos to NEG.

10. When the second derivative changes signs, the function has a inflection pt.

11. The slope of the function is 0 when the derivative is zero.

12. An exponentially increasing function has a derivative that is always positive.

13. If the slope of a function is increasing, the second derivative is Positive.

14. If the function has a maximum, the second derivative is negative.

15. If a function has a plateau, the derivative does not change signs. ~~s~~slope