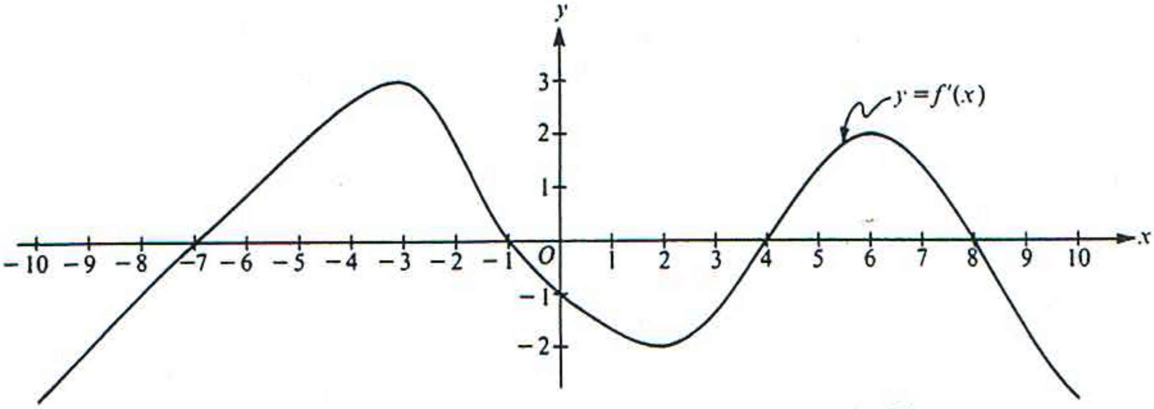
1989 - AB5



Note: This is the graph of the derivative of f, not the graph of f.

The figure above shows the graph of f', the derivative of a function f. The domain of f is the set of all real numbers x such that $-10 \leqq x \leqq 10$.

(a) For what values of x does the graph of f have a horizontal tangent?

(b) For what values of x in the interval $(-10, 10)$ does f have a relative maximum? Justify your answer.

(c) For what values of x is the graph of f concave downward?

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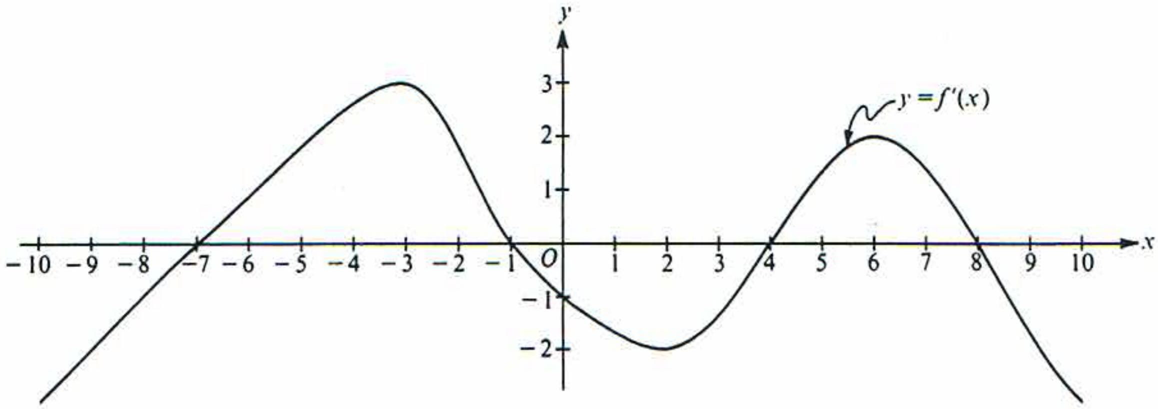

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a.) f has a horizontal tangent at points where $f'(x) = 0$. This occurs at $x = -7, -1, 4, 8$

b.)

	-10 to -7	-7 to -1	-1 to 4	4 to 8	8 to 10
$f'(x)$:	−	+	−	+	−
f:	decr.	incr.	decr.	incr.	decr.

f has a relative max. at $x = -1$ and at $x = 8$

$$\left.\begin{array}{l} f \text{ continuous at } x=a \\ f \text{ increasing when } x<a \\ f \text{ decreasing when } x>a \end{array}\right\} \Rightarrow f(a) \text{ is a relative max.}$$

c.)

	-10 to -3	-3 to 2	2 to 6	6 to 10
$f''(x)$:	+	−	+	−

f is concave down when $-3 < x < 2$ or $6 < x < 10$

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