

1. Identify what each of the statements indicates about the function. Where multiple statements are given, provide a conclusion that can be drawn from the group of statements.

- | | |
|---|--|
| a) $f'(10) = 0$ | b) $p'(x) < 0$ for $0 < x < 5$ |
| c) $q'(x) > 0$ for $x > 8$ | d) $r''(x) > 0$ for $-2 < x < 2$ |
| e) $s''(x) < 0$ for $x < 9$ | f) $g'(5) = 0$ and $g''(5) > 0$ |
| g) $h'(-3) = 0$ and $h''(-3) < 0$ | h) $v'(15) = 0$ $v'(x) > 0$ for $x < 15$ $v'(x) < 0$ for $x > 15$ |
| i) $w'(4) = 0$ $w'(x) < 0$ for $x < 4$ $w'(x) > 0$ for $x > 4$ | j) $m'(3) = 0$ $m'(x) < 0$ for $x < 3$ $m'(x) < 0$ for $x > 3$ |
| k) $a''(6) = 0$ $a''(x) < 0$ for $x < 6$ $a''(x) > 0$ for $x > 6$ | l) $b''(12) = 0$ $b''(x) < 0$ for $x < 12$ $b''(x) < 0$ for $x > 12$ |

2. Information is supplied regarding a function f . Provide conclusions that can be drawn from the given information. Using the information provided, sketch a possible graph of $y = f(x)$.

- a) $f'(-1) = f'(0) = f'(4) = 0$
 $f'(x) < 0$ for $\{x \mid x < -1, 0 < x < 4, x \in \mathbb{R}\}$
 $f'(x) > 0$ for $\{x \mid -1 < x < 0, x > 4, x \in \mathbb{R}\}$
- b) Domain of f $\{x \mid x > 2, x \in \mathbb{R}\}$
 $f'(x) > 0$ for $\{x \mid x > 2, x \in \mathbb{R}\}$
 $f''(x) < 0$ for $\{x \mid x > 2, x \in \mathbb{R}\}$
 $f'(x)$ is never zero
 $f''(x)$ is never zero
- c) $f'(-1) = f'(2) = 0$
 $f''(0) = f''(2) = 0$
 $f'(x) > 0$ for $\{x \mid -1 < x < 2, x > 2, x \in \mathbb{R}\}$
 $f'(x) < 0$ for $\{x \mid x < -1, x \in \mathbb{R}\}$
 $f''(-1) > 0, f''(2) = 0$
 $f''(x) > 0$ for $\{x \mid x < 0, x > 2, x \in \mathbb{R}\}$
 $f''(x) < 0$ for $\{x \mid 0 < x < 2, x \in \mathbb{R}\}$
- d) $f(3) = f(-3) = 0$
 $f'(0) = 0$
 $f'(x) > 0$ for $\{x \mid x > 3, -3 < x < 0, x \in \mathbb{R}\}$
 $f'(x) < 0$ for $\{x \mid x < -3, 0 < x < 3, x \in \mathbb{R}\}$

e) $f'(3) = 0$

$f''(3) = 0$

$f''(x) > 0$ for $\{x | x < 3, x \in R\}$

$f''(x) > 0$ for $\{x | x > 3, x \in R\}$

f) $f'(0) = f'(6) = 0$

$f''(0) > 0$

$f''(6) < 0$

$f''(10) = f''(2) = 0$

$f''(x) > 0$ for $\{x | x < 2, x > 10, x \in R\}$

$f''(x) < 0$ for $\{x | 2 < x < 10, x \in R\}$

g) $f(-4) = f(0) = f(4) = 0$

$f'(-2) = f'(0) = f'(2) = 0$

$f'(x) < 0$ for $\{x | -2 < x < 0, 0 < x < 2, x \in R\}$

$f'(x) > 0$ for $\{x | x < -2, x > 2, x \in R\}$

$f''(x) > 0$ for $\{x | -1 < x < 0, x > 1, x \in R\}$

$f''(x) < 0$ for $\{x | x < -1, 0 < x < 1, x \in R\}$

h) $f'(4) = 0$

$f''(4) = 0$

$f''(x) < 0$ for $\{x | x < 4, x \in R\}$

$f''(x) < 0$ for $\{x | x > 4, x \in R\}$

i) $f(0) = 0$

$f''(x) > 0$ for $x \neq 0$

$\lim_{x \rightarrow 0^-} f'(x) = \infty$

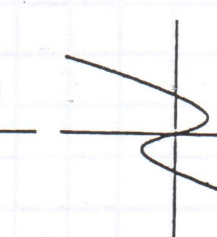
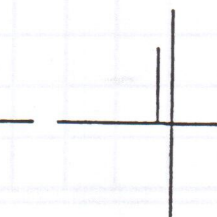
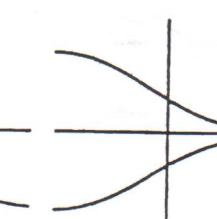
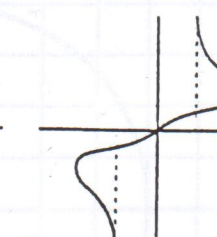
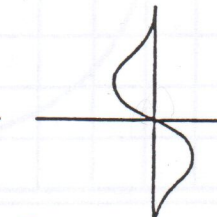
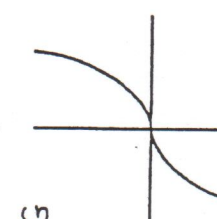
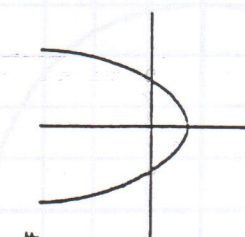
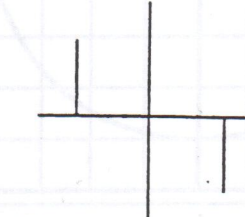
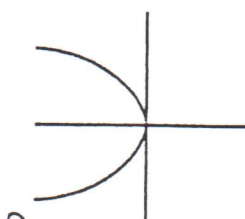
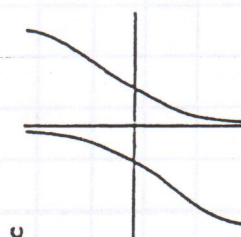
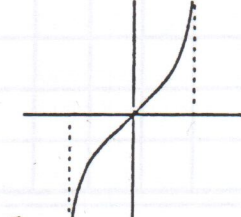
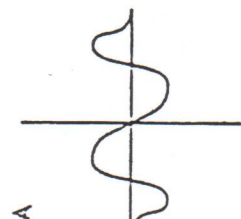
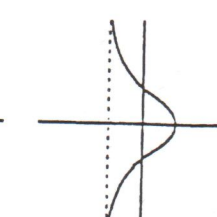
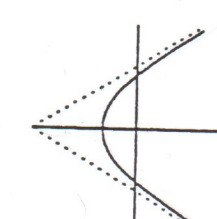
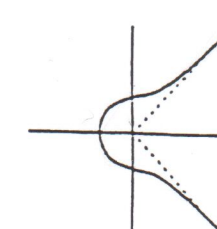
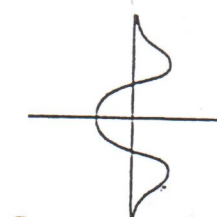
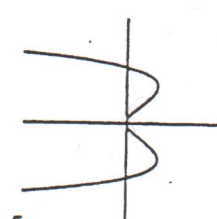
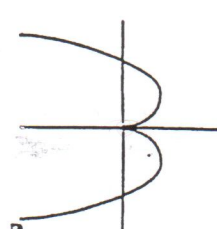
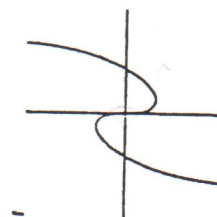
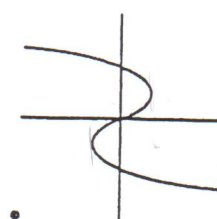
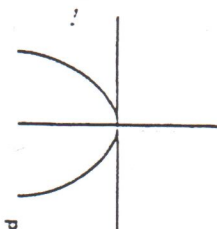
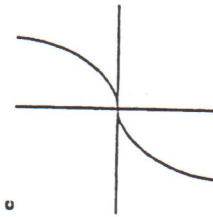
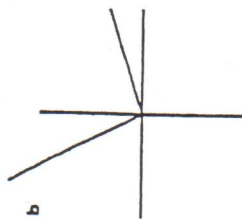
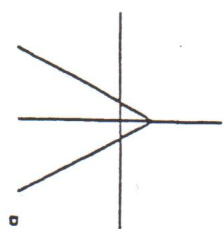
$\lim_{x \rightarrow 0^+} f'(x) = -\infty$

$\lim_{x \rightarrow -\infty} f(x) = -\infty$

$\lim_{x \rightarrow \infty} f(x) = \infty$

Graphs - Matching

3. Match each of the twelve graphs (a-l) with the correct graph (A-L) of its derivative.



Sketch the graph of the derivative for the relation below.

Sketch the graph of the derivative for the relation below.

