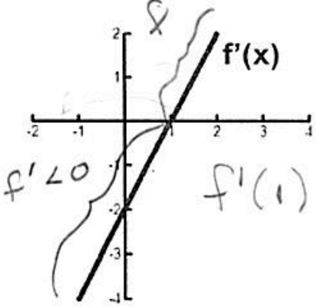
AP Calculus Name ___________________________________

Worksheet for graphs of f, f', and f''

1) Use the graph of f' given in the figure to choose the true statement about f.

f'>0



f'<0

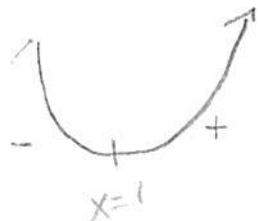
f'(1)=0

~~a)~~ f has no relative extrema rel min @ x=1

~~b)~~ f is increasing on the interval $(-\infty,\infty)$.

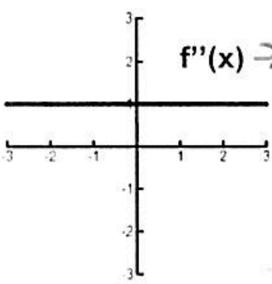
c) f is decreasing on the interval $(-\infty,1)$.

~~d)~~ f has a relative maximum at x = 1. min



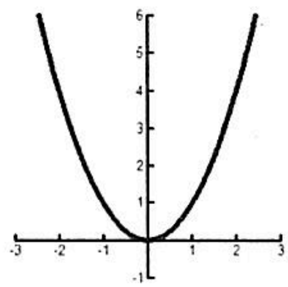
~~e)~~ None of these

2) The figure given in the graph is the second derivative of a polynomial function, f. Choose a graph of f.

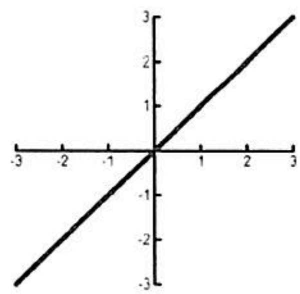


→ + concave up

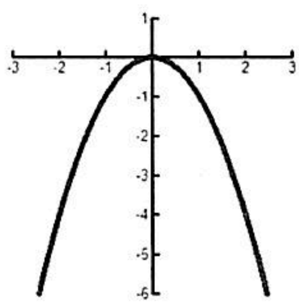
a)



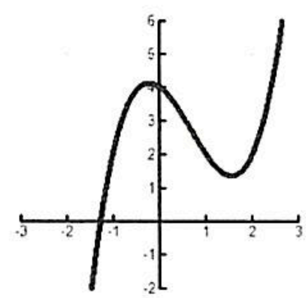
b)



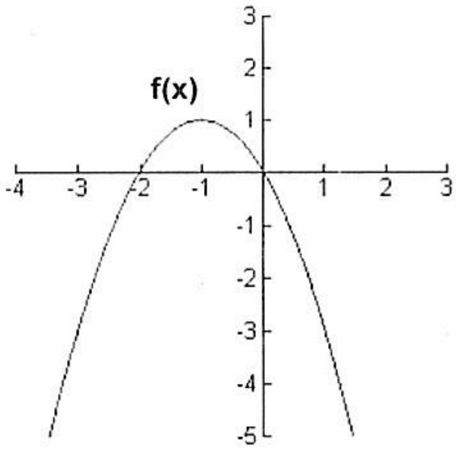
c)

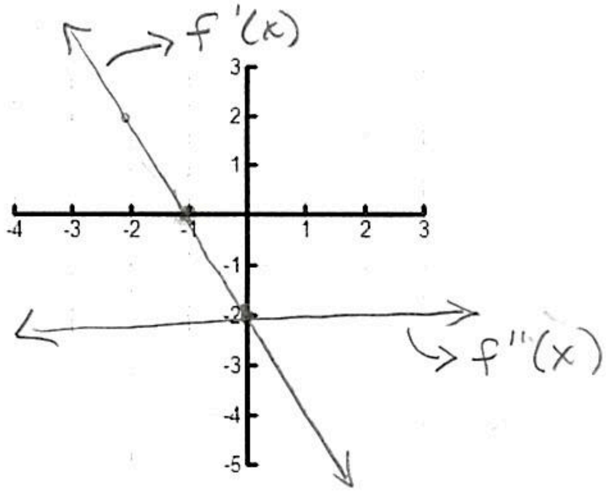


d)

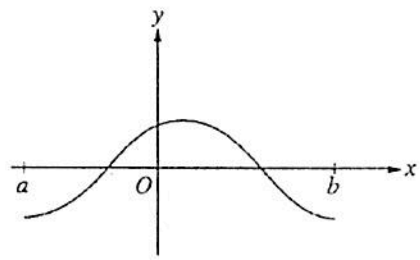


3) The graph of the polynomial function, $f(x) = -(x + 1)^2 + 1$, is given. On the given coordinate axes sketch f' and f''.

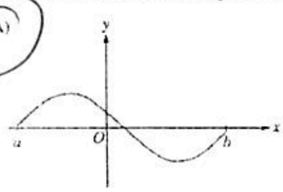




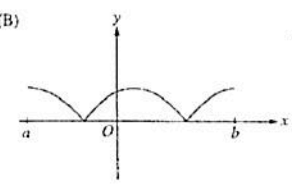
4) The graph of *f* is shown in the figure to the right. (f')
Which of the following could be the graph of the derivative of *f*?



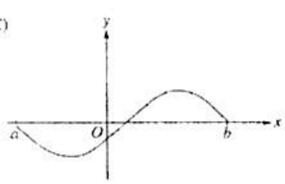
(A)



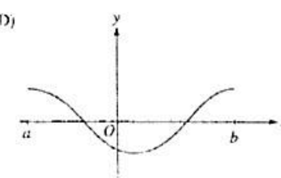
(B)



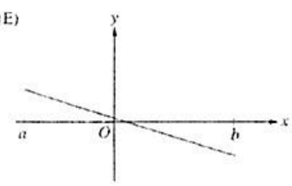
(C)



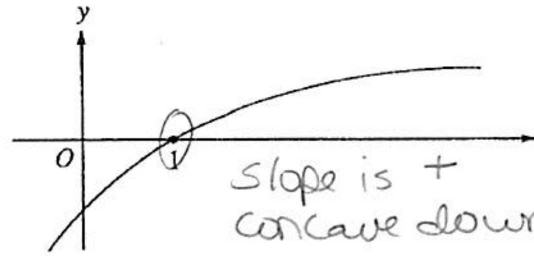
(D)



(E)



5) The graph of a twice-differentiable function f is shown in the figure to the right. Which of the following is true?



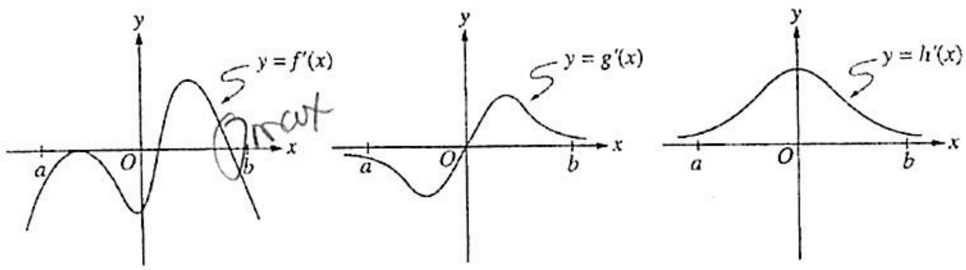
$f(1)=0$ $\quad f'(1)=+$

$f''(1)=-$

slope is +
concave down

(A) $f(1) < f'(1) < f''(1)$ (B) $f(1) < f''(1) < f'(1)$

(C) $f'(1) < f(1) < f''(1)$ (D) $f''(1) < f(1) < f'(1)$ (E) $f''(1) < f'(1) < f(1)$



6) The graphs of the derivatives of the functions f, g, and h are shown above. Which of the functions f, g, or h have a relative maximum on the open interval $a < x < b$? Slope chg + to −

(A) f only (B) g only (C) h only

(D) f and g only (E) f, g, and h

x	−4	−3	−2	−1	0	1	2	3	4
$g'(x)$	2	3	0	−3	−2	−1	0	3	2

7) The derivative g' of a function g is continuous and has exactly two zeros. Selected values of g' are given in the table above. If the domain of g is the set of all real numbers, then g is decreasing on which of the following intervals?

(A) $-2 \le x \le 2$ only (B) $-1 \le x \le 1$ only (C) $x \ge -2$

(D) $x \ge 2$ only (E) $x \le -2$ or $x \ge 2$

g decreases when $g' < 0$

not decreasing at ±2

8) The graph of f', the derivative of the function f, is shown ~~above~~ below. Which of the following statements is true about f?

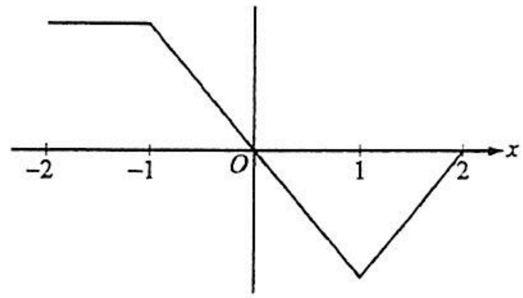
(A) f is decreasing for $-1 \le x \le 1$.

(B) f is increasing for $-2 \le x \le 0$. → b/c $f' > 0$

(C) f is increasing for $1 \le x \le 2$.

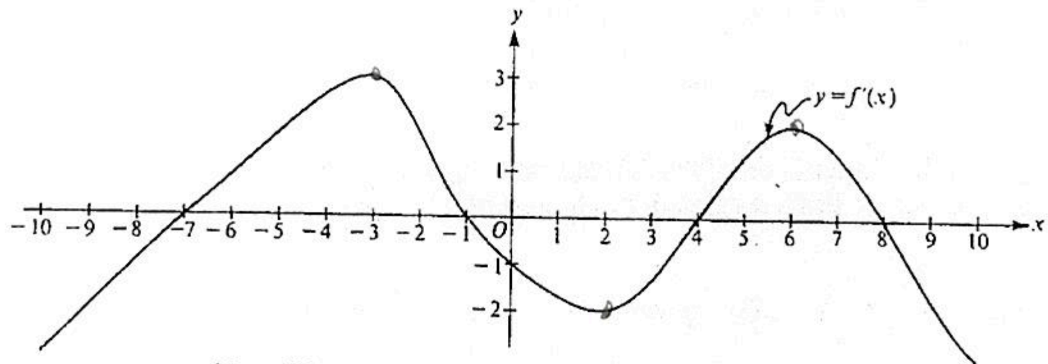
(D) f has a local minimum at $x = 0$. max

(E) f is not differentiable at $x = -1$ and $x = 1$.



Graph of f'

9) 5



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 $-10 \le x \le 10$.

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

$f(x)$ has horizontal tangents at $x = -7$, $x = -1$, $x = 4$ + $x = 8$ b/c these are where $f'(x) = 0$.

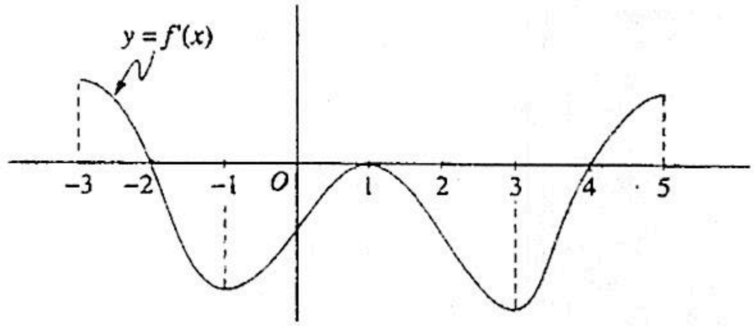
(b) For what values of x in the interval $(-10, 10)$ does f have a relative maximum? Justify your answer.

f has a rel max at $x = -1$ + $x = 8$ b/c f' changes from + to −, by 1st deriv. test.

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

f is concave down from $(-3, 2) \cup (6, 10)$ b/c f'' is − over these intervals, by 2nd der. test

10)



Note: This is the graph 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 $-3 < x < 5$.

(a) For what values of *x* does *f* have a relative maximum? Why?

By 1st deriv. test, f(x) has a rel max at x=−2 b/c f′(x) changes from + to − at x=−2

(b) For what values of *x* does *f* have a relative minimum? Why?

By 1st der. test, f(x) has a rel min at x=4 b/c f′(x) changes from − to + at x=4

(c) On what intervals is the graph of *f* concave upward? Use f' to justify your answer.

f is concave down (−3,−1) U (1,3) b/c f′ is decreasing over these intervals.

(d) Suppose that $f(1) = 0$. Draw a sketch that shows the general shape of the graph of the function *f* on the open interval $0 < x < 2$.