Name **Date** **Class**

Homework 4.5

For questions 1 – 3, although they are multiple choice in format, you must provide a reason for your choice.

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

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

bc g' changes from + to − at $x=-2$ and − to + at $x=1$

A. $-2 < x < 2$ only B. $-1 \le x \le 1$ only C. $x \ge -2$

D. $x \ge 2$ only E. $x \le -2$ or $x \ge 2$

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2. The second derivative of the function f is given by $f''(x) = x(x-a)(x-b)^2$. The graph of $f''(x)$ is shown to the right. For what values of x does the graph of $f'(x)$ have a relative maximum?

A. j and k only

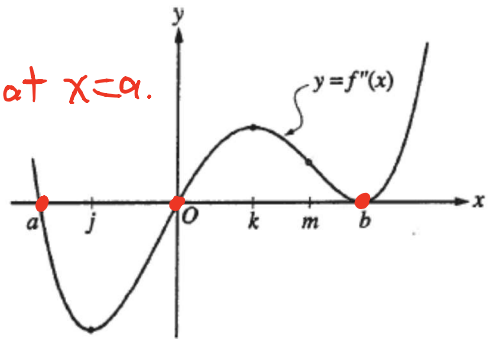
B. a and b only

C. a only

D. 0 only

E. a and 0 only

f'' changes from + to − at $x=a$.



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3. A table of function values for a twice differentiable function, $f(x)$, is pictured to the right. Which of the following statements is/are true if $f(x)$ has only one zero on the $-3 \le x \le 3$?

I. $f'(x) < 0$ on the interval $-3 < x < 3$. ✓ $f(x)$ is decreasing on $(-3, 3)$

II. $f(x)$ has a zero between $x = 1$ and $x = 3$. ✓ $f(x)$ changes sign between $x=1$ and $x=3$

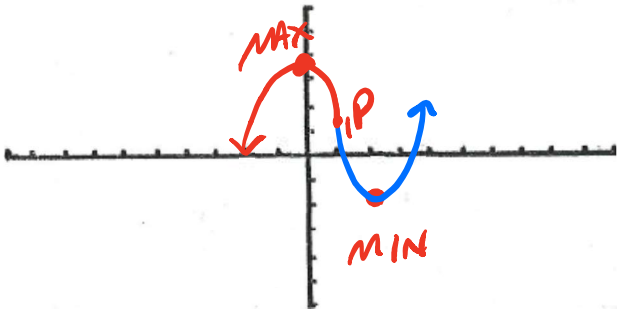
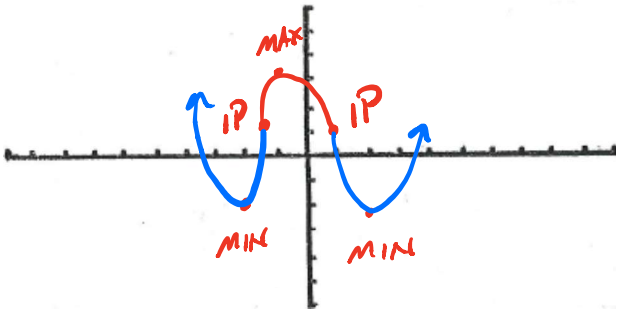
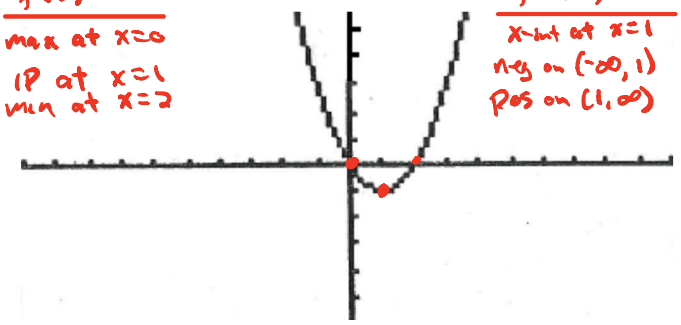
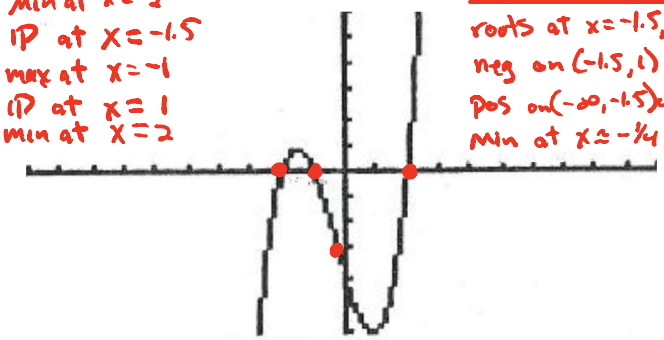
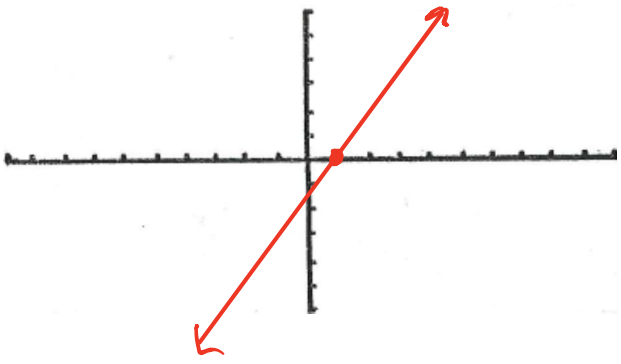
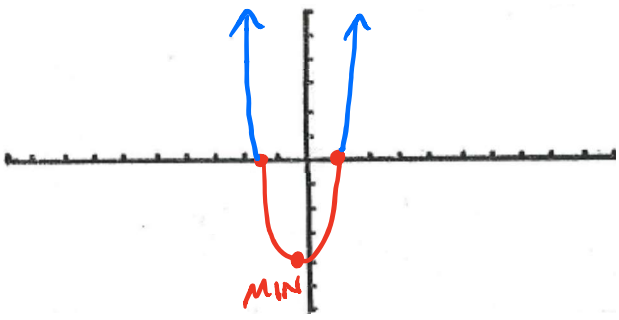
III. $f''(x) > 0$ on the interval $-3 < x < 3$. ✗

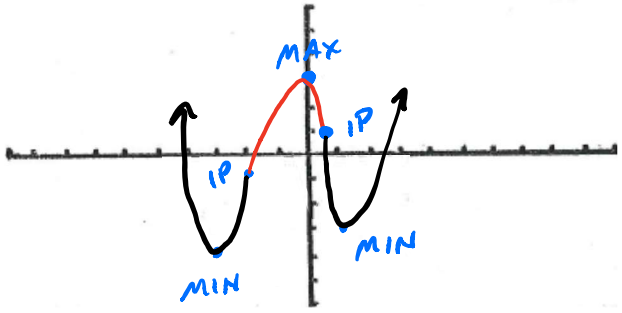
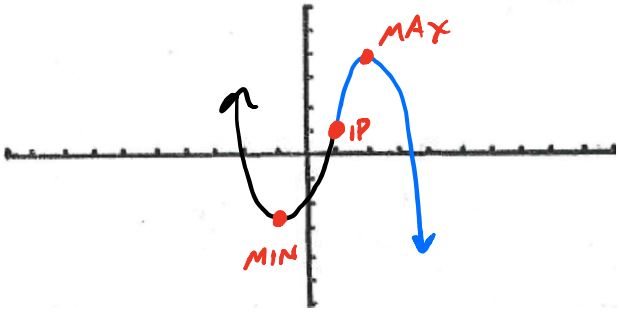
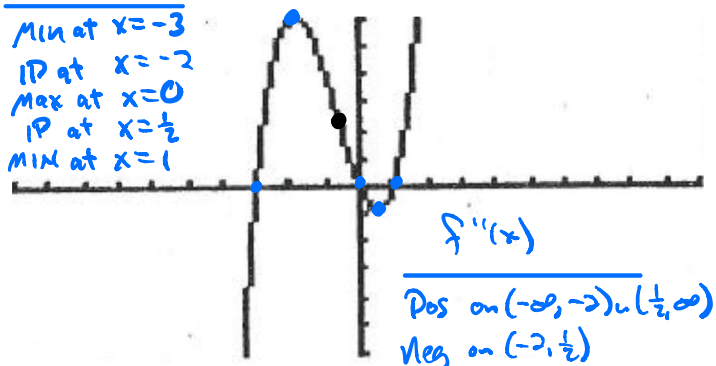
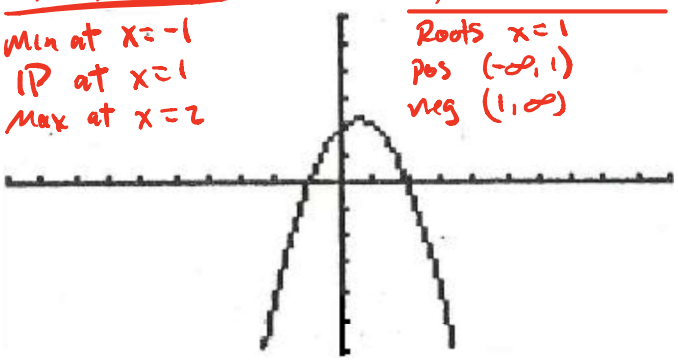
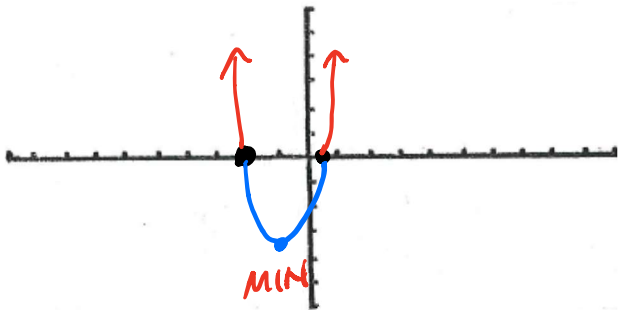
x	$f(x)$	
−3	10	} −2
−1	8	} −6
1	2	} −15
3	−13	

A. I only B. I and II only C. III only

D. II and III only E. I, II and III

The graph of $f'(x)$, a polynomial function, is given. First, state what type of functions $f(x)$ and $f''(x)$ should be. Then, based on the graph of $f'(x)$, sketch possible graphs of $f(x)$ and $f''(x)$.

4.	5.
$f(x)$ Cubic 	$f(x)$ Quartic 
$f'(x)$  f(x): max at x=0; IP at x=1; min at x=2. f''(x): x-int at x=1; neg on (-∞,1); pos on (1,∞)	$f'(x)$  f(x): min at x=-2; IP at x=-1.5; max at x=-1; IP at x=1; min at x=2. f''(x): roots at x=-1.5, 1; neg on (-1.5,1); pos on (-∞,-1.5)∪(1,∞); min at x≈-¼
$f''(x)$ Linear 	$f''(x)$ quadratic 

6.	7.
$f(x)$ Quartic 	$f(x)$ Cubic 
$f'(x)$  f(x) Min at $x=-3$ IP at $x=-2$ Max at $x=0$ IP at $x=\frac{1}{2}$ MIN at $x=1$ f''(x) Pos on $(-\infty,-2)\cup(\frac{1}{2},\infty)$ Neg on $(-2,\frac{1}{2})$ Roots $x=-2,\frac{1}{2}$ MIN at $x=-1$	$f'(x)$  f(x) Min at $x=-1$ IP at $x=1$ Max at $x=2$ f''(x) Roots $x=1$ Pos $(-\infty,1)$ Neg $(1,\infty)$
$f''(x)$ Quadratic 	$f''(x)$ Linear