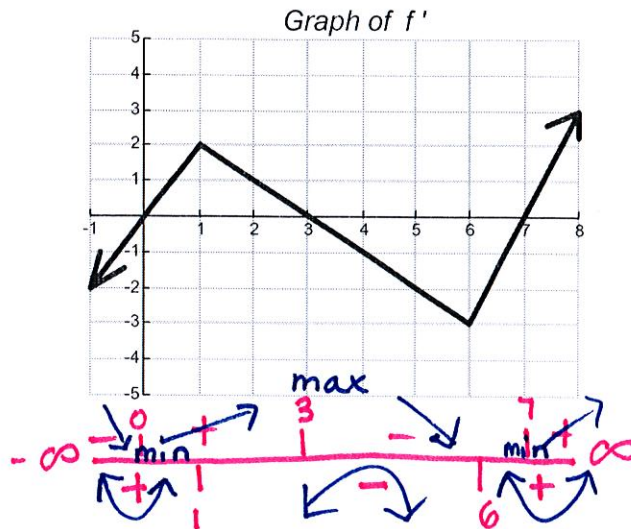


What Does  $f'$  say about  $f$ ?

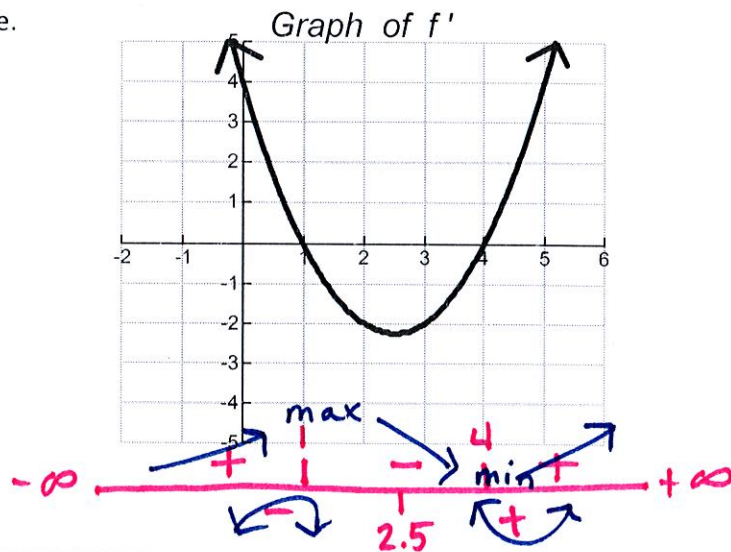
1. Make a sign chart from the graph of the derivative.  
Answer each of the following questions about  $f$ .

Critical Numbers	$x=0, 3, \text{ \& } 7$
Increasing	$(0, 3) \cup (7, \infty)$
Decreasing	$(-\infty, 0) \cup (3, 7)$
Points of Inflection	$x=1 \text{ \& } x=6$
Concave Up	$(-\infty, 1) \cup (6, \infty)$
Concave Down	$(1, 6)$
Extrema	maximum: $x=3$ minimum: $x=0 \text{ \& } 7$



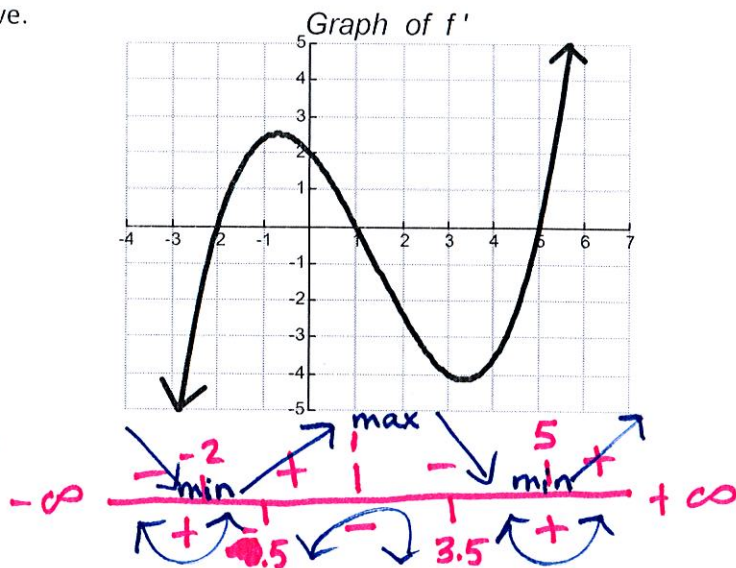
2. Make a sign chart from the graph of the derivative.  
Answer each of the following questions about  $f$ .

Critical Numbers	$x=1 \text{ \& } 4$
Increasing	$(-\infty, 1) \cup (4, \infty)$
Decreasing	$(1, 4)$
Points of Inflection	$x=2.5$
Concave Up	$(2.5, \infty)$
Concave Down	$(-\infty, 2.5)$
Extrema	maximum: $x=1$ minimum: $x=4$



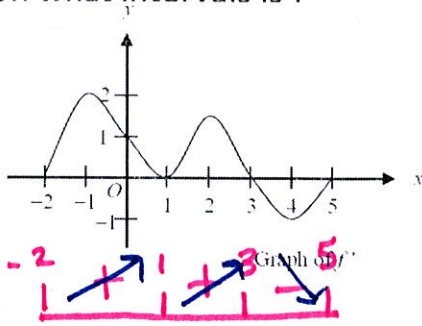
3. Make a sign chart from the graph of the derivative.  
Answer each of the following questions about  $f$ .

Critical Numbers	$x=-2, 1, \text{ \& } 5$
Increasing	$(-2, 1) \cup (5, \infty)$
Decreasing	$(-\infty, -2) \cup (1, 5)$
Points of Inflection	$x=-\frac{1}{2} \text{ \& } 3\frac{1}{2}$
Concave Up	$(-\infty, -\frac{1}{2}) \cup (3\frac{1}{2}, \infty)$
Concave Down	$(-\frac{1}{2}, 3\frac{1}{2})$
Extrema	maximum: $x=1$ minimum: $x=-2 \text{ \& } 5$



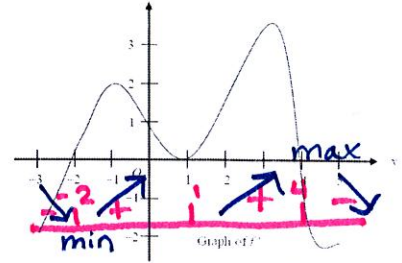
Multiple Choice

4. The graph of  $f'$ , the derivative of  $f$ , is shown for  $-2 \leq x \leq 5$ . On what intervals is  $f$  increasing?



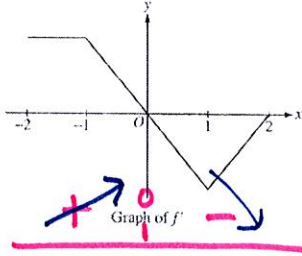
- (A)  $[-2, 1]$  only
- (B)  $[-2, 3]$
- (C)  $[3, 5]$  only
- (D)  $[0, 1.5]$  and  $[3, 5]$
- (E)  $[-2, -1]$ ,  $[1, 2]$ , and  $[4, 5]$

5. The graph of the derivative of a function  $f$  is shown in the figure. The graph has horizontal tangent lines at  $x = -1$ ,  $x = 1$ , and  $x = 3$ . At which of the following values of  $x$  does  $f$  have a relative maximum?



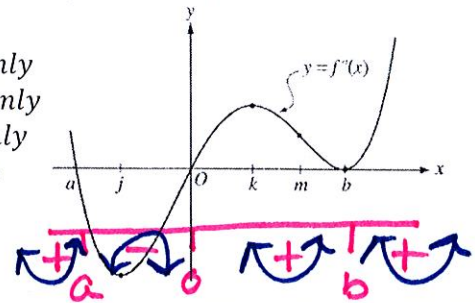
- (A)  $-2$  only
- (B)  $1$  only
- (C)  $4$  only
- (D)  $-1$  and  $3$  only
- (E)  $-2, 1,$  and  $4$

6. The graph of  $f'$ , the derivative of the function  $f$ , is shown. Which of the following statements is true about  $f$ ?



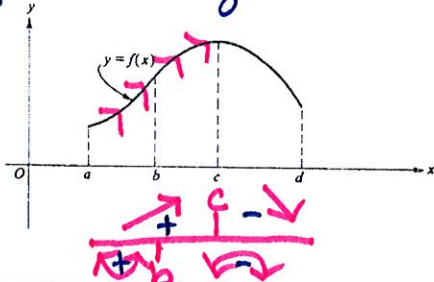
- (A)  $f$  is decreasing for  $-1 \leq x \leq 1$ . **F**
  - (B)  $f$  is increasing for  $-2 \leq x \leq 0$ . **T**
  - (C)  $f$  is increasing for  $1 \leq x \leq 2$ . **F**
  - (D)  $f$  has a local minimum at  $x = 0$ . **F**
  - (E)  $f$  is not differentiable at  $x = -1$  and  $x = 1$ . **F**
- f'' is not*

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



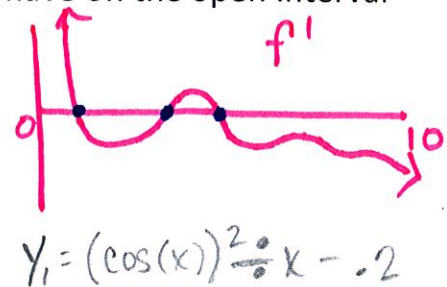
- (A)  $0$  and  $a$  only
- (B)  $0$  and  $m$  only
- (C)  $b$  and  $j$  only
- (D)  $0, a,$  and  $b$
- (E)  $b, j,$  and  $k$

8. The graph of  $y = f(x)$  is shown in the figure to the right. On which of the following intervals are  $\frac{dy}{dx} > 0$  and  $\frac{d^2y}{dx^2} < 0$ ?



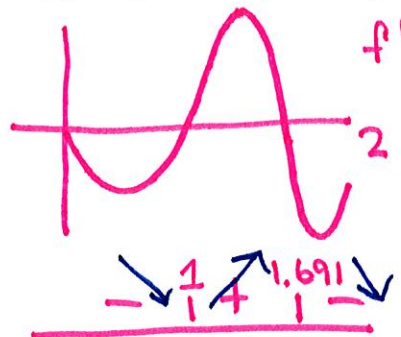
- I.  $a < x < b$  **f' pos** **f'' neg**
- II.  $b < x < c$
- III.  $c < x < d$
- (A) I only
- (B) II only
- (C) III only
- (D) I and II
- (E) II and III

9. The first derivative of the function  $f$  is given by  $f'(x) = \frac{\cos^2 x}{x} - \frac{1}{5}$ . How many critical values does  $f$  have on the open interval  $(0, 10)$ ?



- (A) One
- (B) Three
- (C) Four
- (D) Five
- (E) Seven

10. The first derivative of the function  $f$  is defined by  $f'(x) = \sin(x^3 - x)$  for  $0 \leq x \leq 2$ . On what interval(s) is  $f$  increasing?



- (A)  $1 \leq x \leq 1.445$
- (B)  $1 \leq x \leq 1.691$
- (C)  $1.445 \leq x \leq 1.875$
- (D)  $0.577 \leq x \leq 1.445$  and  $1.875 \leq x \leq 2$
- (E)  $0 \leq x \leq 1$  and  $1.691 \leq x \leq 2$