WINTER BREAK AP Practice

Name _____ PER _____ DATE _____

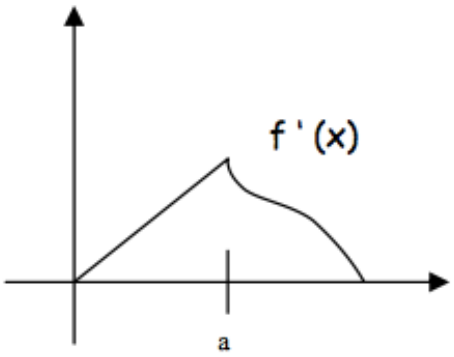
1. Find dy/dx for $y = 2\sqrt{x} - \frac{1}{2\sqrt{x}}$

a. $x + \frac{1}{x\sqrt{x}}$ b. $x^{-\frac{1}{2}} + x^{\frac{-3}{2}}$ c. $\frac{4x-1}{4x\sqrt{x}}$ d. $\frac{1}{\sqrt{x}} + \frac{1}{4x\sqrt{x}}$ e. $\frac{4}{\sqrt{x}} + \frac{1}{x\sqrt{x}}$

2. The maximum value of the function $y = -4\sqrt{2-x}$ is

a. 0 b. -4 c. 2 d. -2 e. none of these

3. It follows from the graph of $f'(x)$ shown below at the right, that



a. $f(x)$ is not continuous at $x = a$

b. $f(x)$ is continuous but not differentiable

c. $f(x)$ has a relative max at $x = a$

d. $f(x)$ has a point of inflection at $x = a$

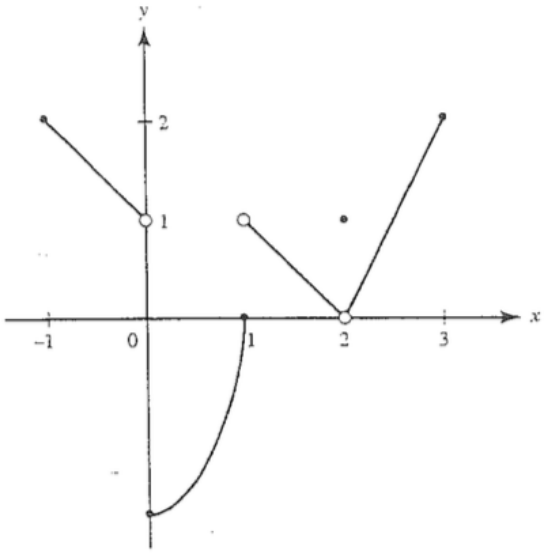
e. none of these

Questions 4 - 9 are based on the function f shown in the graph and defined below:

$$f(x) = \begin{cases} 1 - x & (-1 \le x < 0) \\ 2x^2 - 2 & (0 \le x \le 1) \\ -x + 2 & (1 < x < 2 \\ 1 & (x = 2) \\ 2x - 2 & (2 < x \le 3) \end{cases}$$

4. $\lim_{x \to 2} f(x)$

   a. equals 0
   b. equals 1
   c. equals 2
   d. does not exist
   e. none of these



5. The function f is definied on $[-1, 3]$

   a. If $x \neq 0$
   b. If $x \neq 1$
   c. If $x \neq 2$
   d. If $x \neq 3$
   e. At each x in $[-1, 3]$

6. The function f has a removable discontinuity at

   a. $x = 0$
   b. $x = 1$
   c. $x = 2$
   d. $x = 3$
   e. none of these

7. On which of the following intervals is f continuous?

   a. $-1 \le x \le 0$
   b. $0 < x < 1$
   c. $1 \le x \le 2$
   d. $2 \le x \le 3$
   e. none of these

8. The function f has a jump discontinuity at

   a. $x = -1$
   b. $x = 1$
   c. $x = 2$
   d. $x = 3$
   e. none of these

9. A differentiable function f has the values shown. Estimate $f'(1.5)$.

x	1.0	1.2	1.4	1.6
$f(x)$	8	10	14	22

a. 8 b. 12 c. 18 d. 40 e. 80

10. From the values show in the table below, estimate $f'(2)$.

x	1.92	1.94	1.96	1.98	2.00
$f(x)$	6.00	5.00	4.40	4.10	4.00

a. -0.10 b. -0.20 c. -5 d. -10 e. -25

11. $\lim_{x\to 0} \frac{\sin 2x}{x}$ is

a. 1 b. 2 c. $\frac{1}{2}$ d. 0 e. ∞

12. $\lim_{x\to 0} \frac{\tan \pi x}{x}$ is

a. $\frac{1}{\pi}$

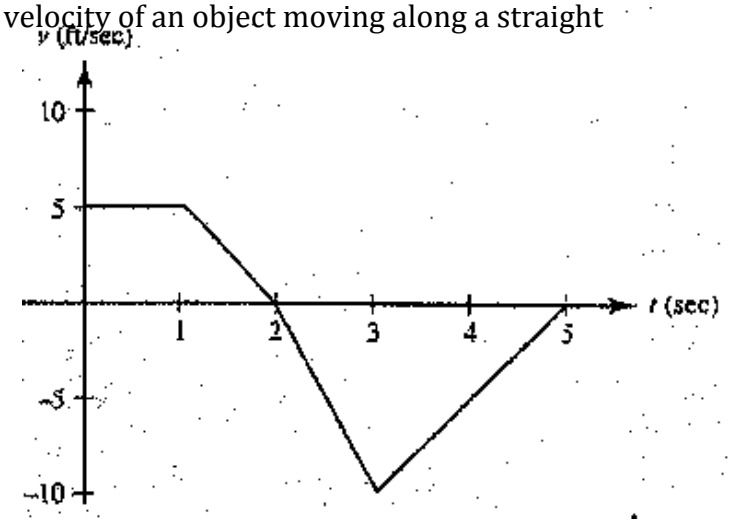
b. 0

c. 1

d. π

e. ∞

Use the graph shown for questions 13-29. It shows the velocity of an object moving along a straight line during the time interval $0 \le t \le 5$.



13. The object attains its maximum speed when $t =$

a. 0 c. 2 e. 5

b. 1 d. 3

14. The speed of the object is increasing during the time interval

a. (0,1) c. (0,2) e. (3,5)

b. (1,2) d. (2,3)

15. The acceleration of the object is positive during the time interval

a. (0,1) b. (1,2) c. (0,2) d. (2,3) e. (3,5)

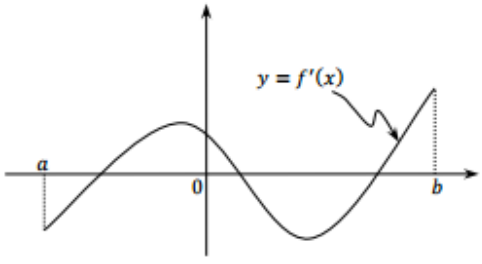
16. how many times on $0 < t < 5$ is the object's acceleration undefined?

a. None b. 1 c. 2 d. 3 e. more than 3

17. During $2 < t < 3$ the object's acceleration (in ft/sec^2) is

a. -10 b. -5 c. 0 d. 5 e. 10

6.) The graph of f', the derivative of f, is shown in the figure below. Which of the following describes all relative extrema of f on the open interval (a, b)?



(A) One relative maximum and two relative minima
(B) Two relative maxima and one relative minimum
(C) Three relative maxima and one relative minimum
(D) One relative maximum and three relative minima
(E) Two relative maxima and two relative minima

FRQ Practice 1

10.) Suppose that the function f has a continuous second derivative for all x, and that $f(0) = 2$, $f'(0) = -3$, and $f''(0) = 0$. Let g be the function whose derivative is given by $g'(x) = e^{-2x}(3f(x) + 2f'(x))$ for all x.

a.) Write an equation of the line tangent to the graph of f at the point where $x = 0$.

b.) Is there sufficient information to determine whether or not the graph of f has a point of inflection when $x = 0$? Explain your answer.

c.) Given that $g(0) = 4$, write an equation of the line tangent to the graph of g at the point where $x = 0$.

d.) Show that $g''(x) = e^{-2x}(-6f(x) - f'(x) + 2f''(x))$.

FRQ Practice 2

Let h be a function defined for all $x \neq 0$ such that $h(4) = -3$ and the derivative of h is given by $h'(x) = \dfrac{x^2 - 2}{x}$ for all $x \neq 0$.

(a) Find all values of x for which the graph of h has a horizontal tangent, and determine whether h has a local maximum, a local minimum, or neither at each of these values. Justify your answers.

(b) On what intervals, if any, is the graph of h concave up? Justify your answer.

(c) Write an equation for the line tangent to the graph of h at $x = 4$.

(d) Does the line tangent to the graph of h at $x = 4$ lie above or below the graph of h for $x > 4$? Why?