

AP CALCULUS TEST PART 2 Multiple Choice
SHOW ALL YOUR WORK ON A SEPARATE SHEET.

13. If $x^2 + xy + y^3 = 0$, then, in terms of x and y , $\frac{dy}{dx} =$

- (A) $-\frac{2x+y}{x+3y^2}$ (B) $-\frac{x+3y^2}{2x+y}$ (C) $\frac{-2x}{1+3y^2}$ (D) $\frac{-2x}{x+3y^2}$ (E) $-\frac{2x+y}{x+3y^2-1}$

16. The function defined by $f(x) = x^3 - 3x^2$ for all real numbers x has a relative maximum at $x =$

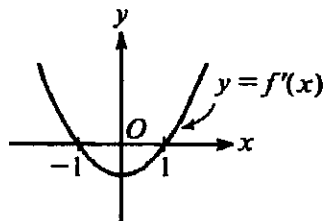
- (A) -2 (B) 0 (C) 1 (D) 2 (E) 4

18. If $y = \cos^2 x - \sin^2 x$, then $y' =$

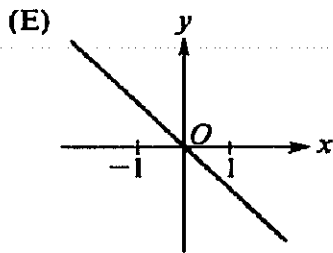
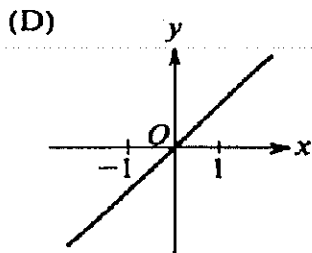
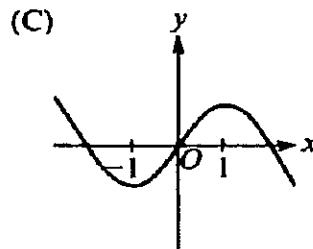
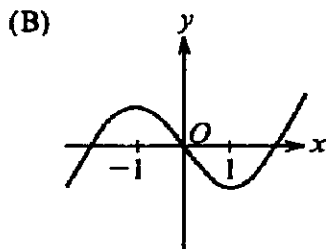
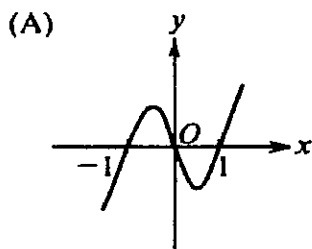
- (A) -1 (B) 0 (C) $-2\sin(2x)$ (D) $-2(\cos x + \sin x)$ (E) $2(\cos x - \sin x)$

31. The volume of a cone of radius r and height h is given by $V = \frac{1}{3}\pi r^2 h$. If the radius and the height both increase at a constant rate of $\frac{1}{2}$ centimeter per second, at what rate, in cubic centimeters per second, is the volume increasing when the height is 9 centimeters and the radius is 6 centimeters?

- (A) $\frac{1}{2}\pi$ (B) 10π (C) 24π (D) 54π (E) 108π



33. The graph of the derivative of f is shown in the figure above. Which of the following could be the graph of f ?



6. ~~8~~ The graph of $y = \frac{-5}{x-2}$ is concave downward for all values of x such that

- (A) $x < 0$ (B) $x < 2$ (C) $x < 5$ (D) $x > 0$ (E) $x > 2$

7. ~~15~~ If $f(x) = \sqrt{2x}$, then $f'(2) =$

- (A) $\frac{1}{4}$ (B) $\frac{1}{2}$ (C) $\frac{\sqrt{2}}{2}$ (D) 1 (E) $\sqrt{2}$

8. ~~16~~ A particle moves along the x -axis so that at any time $t \geq 0$ its position is given by $x(t) = t^3 - 3t^2 - 9t + 1$. For what values of t is the particle at rest?

- (A) No values (B) 1 only (C) 3 only (D) 5 only (E) 1 and 3

9. If $x + 2xy - y^2 = 2$, then at the point $(1, 1)$, $\frac{dy}{dx}$ is

- (A) $\frac{3}{2}$ (B) $\frac{1}{2}$ (C) 0 (D) $-\frac{3}{2}$ (E) nonexistent

10. ~~18~~ If $y = 2 \cos\left(\frac{x}{2}\right)$, then $\frac{d^2y}{dx^2} =$

- (A) $-8 \cos\left(\frac{x}{2}\right)$ (B) $-2 \cos\left(\frac{x}{2}\right)$ (C) $-\sin\left(\frac{x}{2}\right)$ (D) $-\cos\left(\frac{x}{2}\right)$ (E) $-\frac{1}{2} \cos\left(\frac{x}{2}\right)$

11. ~~45~~ The volume of a cylindrical tin can with a top and a bottom is to be 16π cubic inches. If a minimum amount of tin is to be used to construct the can, what must be the height, in inches, of the can?

- (A) $2\sqrt[3]{2}$ (B) $2\sqrt{2}$ (C) $2\sqrt[3]{4}$ (D) 4 (E) 8

12. ~~20~~ Let f be a polynomial function with degree greater than 2. If $a \neq b$ and $f(a) = f(b) = 1$, which of the following must be true for at least one value of x between a and b ?

- I. $f(x) = 0$
II. $f'(x) = 0$
III. $f''(x) = 0$

- (A) None (B) I only (C) II only (D) I and II only (E) I, II, and III

13. An equation of the line tangent to the graph of $f(x) = x(1-2x)^2$ at the point $(1, -1)$ is

(A) $y = -7x + 6$

(B) $y = -6x + 5$

(C) $y = -2x + 1$

(D) $y = 2x - 3$

(E) $y = 7x - 8$

14. If $y = \frac{\ln x}{x}$, then $\frac{dy}{dx} =$

(A) $\frac{1}{x}$

(B) $\frac{1}{x^2}$

(C) $\frac{\ln x - 1}{x^2}$

(D) $\frac{1 - \ln x}{x^2}$

(E) $\frac{1 + \ln x}{x^2}$

15. If $y = x^2 e^x$, then $\frac{dy}{dx} =$

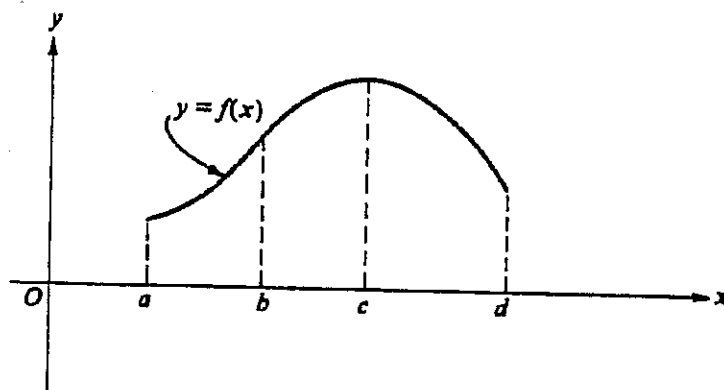
(A) $2xe^x$

(B) $x(x + 2e^x)$

(C) $xe^x(x + 2)$

(D) $2x + e^x$

(E) $2x + e$



16.

The graph of $y = f(x)$ is shown in the figure above. On which of the following intervals are

$\frac{dy}{dx} > 0$ and $\frac{d^2y}{dx^2} < 0$?

I. $a < x < b$

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

17. If $f(x) = \sin x$, then $f'\left(\frac{\pi}{3}\right) =$

(A) $-\frac{1}{2}$

(B) $\frac{1}{2}$

(C) $\frac{\sqrt{2}}{2}$

(D) $\frac{\sqrt{3}}{2}$

(E) $\sqrt{3}$