

AP REVIEW 2

Work the following on notebook paper, showing all work. Use your calculator only on problem 14.

14. Let R be the region in the first quadrant enclosed by the graphs of

$$y = e^{-x^2}, \quad y = 1 - \cos x, \quad \text{and the } y\text{-axis.}$$

- (a) Find the volume of the solid generated when the region R is revolved about the line $y = 2$.
 (b) The region R is the base of a solid. For this solid, each cross section perpendicular to the x -axis is a square. Find the volume of this solid.
 (c) Write an expression involving integrals that could be used to find the perimeter of the region R . Do not evaluate.

15. If $y = xy + x^2 + 1$, then when $x = -1$, $\frac{dy}{dx}$ is

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

16. $\int_1^{\infty} \frac{x}{(1+x^2)^2}$ is

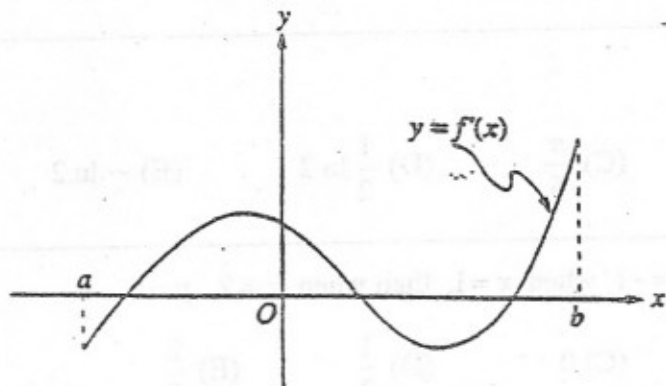
- (A) $-\frac{1}{2}$ (B) $-\frac{1}{4}$ (C) $\frac{1}{4}$ (D) $\frac{1}{2}$ (E) divergent

17. Let f be the function defined by $f(x) = \begin{cases} x^3 & \text{for } x \leq 0 \\ x & \text{for } x > 0 \end{cases}$. Which of the following statements

about f is true?

- (A) f is an odd function. (B) f is discontinuous at $x = 0$. (C) f has a relative maximum.
 (D) $f'(0) = 0$ (E) $f'(x) > 0$ for $x \neq 0$.

18.

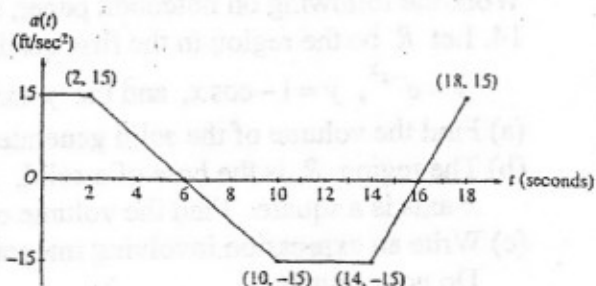


The graph of f' , the derivative of f , is shown in the figure above. Which of the following describes all relative extrema of f on the open interval (a, b) ?

- (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) Three relative maxima and two relative minima

19.

A car is traveling on a straight road with velocity 55 ft/sec at time $t = 0$. For $0 \leq t \leq 18$ seconds, the car's acceleration $a(t)$, in ft/sec², is the piecewise linear function defined by the graph above.



- (a) Is the velocity of the car increasing at $t = 2$ seconds? Why or why not?
- (b) At what time in the interval $0 \leq t \leq 18$, other than $t = 0$, is the velocity of the car 55 ft/sec? Why?
- (c) On the time interval $0 \leq t \leq 18$, what is the car's absolute maximum velocity, in ft/sec, and at what time does it occur? Justify your answer.
- (d) At what times in the interval $0 \leq t \leq 18$, if any, is the car's velocity equal to zero? Justify your answer.

20. An antiderivative for $\frac{1}{x^2 - 2x + 2}$ is

- (A) $-(x^2 - 2x + 2)^{-2}$ (B) $\ln(x^2 - 2x + 2)$ (C) $\ln\left|\frac{x-2}{x+1}\right|$
 (D) $\text{Arcsec}(x-1)$ (E) $\text{Arctan}(x-1)$

21. The region enclosed by the x -axis, the line $x = 3$, and the curve $y = \sqrt{x}$ is rotated about the x -axis. What is the volume of the solid generated?

- (A) 3π (B) $3\sqrt{3}\pi$ (C) $\frac{9}{2}\pi$ (D) 9π (E) $\frac{36\sqrt{3}}{5}\pi$

22. $\int_0^{\sqrt{3}} \frac{dx}{\sqrt{4-x^2}} =$

- (A) $\frac{\pi}{3}$ (B) $\frac{\pi}{4}$ (C) $\frac{\pi}{6}$ (D) $\frac{1}{2}\ln 2$ (E) $-\ln 2$

23. If $\frac{dy}{dx} = 2y^2$ and if $y = -1$ when $x = 1$, then when $x = 2$, $y =$

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

24. The top of a 25-foot ladder is sliding down a vertical wall at a constant rate of 3 feet per minute. When the top of the ladder is 7 feet from the ground, what is the rate of change of the distance between the bottom of the ladder and the wall?

- (A) $-\frac{7}{8}$ feet per minute (B) $-\frac{7}{24}$ feet per minute (C) $\frac{7}{24}$ feet per minute
 (D) $\frac{7}{8}$ feet per minute (E) $\frac{21}{25}$ feet per minute