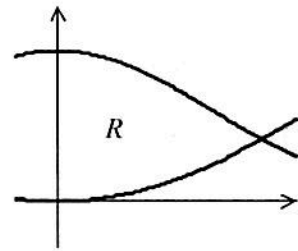


AP REVIEW 2

Work the following on **notebook paper**, showing all work. Use your calculator only on problems 14 and 19.

14. (Calc) Let R be the region in the first quadrant enclosed by the graphs of $y = e^{-x^2}$, $y = 1 - \cos x$, and the y -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. Let f be a function defined for all real numbers x . If $f'(x) = \frac{|4 - x^2|}{x - 2}$, then f is decreasing on the interval

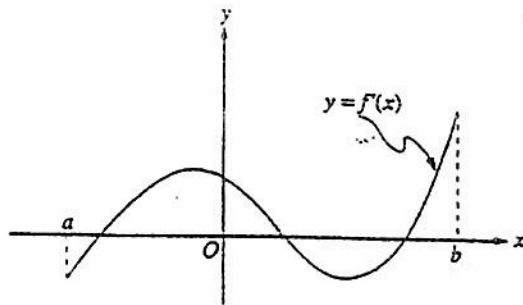
- (A) $(-\infty, 2)$ (B) $(-\infty, \infty)$ (C) $(-2, 4)$ (D) $(-2, \infty)$ (E) $(2, \infty)$

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. (Calc) A particle moves along the x -axis with velocity at time $t \geq 0$ given by $v(t) = -1 + e^{1-t}$.

- (a) Find the acceleration of the particle at time $t = 3$.
- (b) Is the speed of the particle increasing at time $t = 3$? Give a reason for your answer.
- (c) Find all values of t at which the particle changes direction. Justify your answer.
- (d) Find the total distance traveled by the particle over the time interval $0 \leq t \leq 3$.
-

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) $\operatorname{arcsec}(x-1)$ (E) $\arctan(x-1)$
-

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) -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