1. The area of the region between the graph of $y = 3x^2 + 2x$ and the x-axis from $x = 1$ to $x = 3$ is

(A) 36 (B) 34 (C) 31 (D) 26

Answer

$$f(x) = \begin{cases} \dfrac{x^2}{|x|} & \text{for } x \neq 0 \\ 0 & \text{for } x = 0 \end{cases}$$

2. Let f be the continuous function defined above. What is the value of $\int_{-4}^{2} f(x)\,dx$?

(A) –10 (B) –6 (C) 6 (D) 10

Answer

3. For a car traveling at a speed of s miles per hour, the fuel consumption of the car, $C(s)$, is measured in gallons per mile. What are the units of $\int_a^b C(s)\,ds$?

(A) hours per gallon
(B) gallons per hour
(C) miles per hour per gallon
(D) gallons per miles per hour

Answer

4. If the radius of a sphere is increasing at the rate of 2 inches per second, how fast, in cubic inches per second, is the volume increasing when the radius is 10 inches? (The volume of a sphere with radius r is $V = \frac{4}{3}\pi r^3$.)

(A) 40π (B) 80π (C) 400π (D) 800π

Answer

5. A laser beam moves along a straight line so that its velocity is given by $v(t) = t^2 - 4$ feet/sec. What is the total distance, in feet, that the laser beam will have traveled between $t = 1$ and $t = 3$ seconds?

(A) 4 (B) $\frac{16}{3}$ (C) $\frac{38}{3}$ (D) 18

Answer

x	0	1	2	3	4	5
$f(x)$	-8	-5	-2	0	2	1
$f'(x)$	2	4	3	2	0	-3

6. The table above gives values of a function f and its derivative at selected values of x. If f' is continuous on $[0,5]$, what is the value of $\int_1^4 f'(x)\,dx$?

(A) -5 (B) -4 (C) 2 (D) 7

Answer

7. If $\lim_{x \to 3} \frac{g(3) - g(x)}{3 - x} = -0.628$, then near the point where $x = 3$, the graph of $g(x)$

(A) is decreasing

(B) is increasing

(C) is concave downwards

(D) has a point of inflection

Answer

8. $\int_1^3 \frac{x}{x^2 + 1}\, dx =$

(A) $\ln 5$ (B) $2 \ln 5$ (C) $\frac{1}{2} \ln 5$ (D) $\ln\left(\frac{5}{2}\right)$

Answer

9. $\frac{d}{dx}\ln\left(\frac{1}{x^2-1}\right) =$

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

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

(C) x^2-1

(D) $2x^3-2x$

Answer

10. Let $f(x) = e^{2x}$. At how many points in the closed interval $[0,5]$, does the instantaneous rate of change of f equal the average rate of change of f?

(A) None (B) One (C) Two (D) Three

Answer