

1. $\lim_{n \rightarrow \infty} \left[\frac{10}{n} \sum_{i=1}^n \sqrt{\frac{10n + 4i}{2n}} \right] =$

(a) $\frac{10}{3}(7\sqrt{7} - 5\sqrt{5})$

(b) $\frac{10}{3}(\sqrt{7} - \sqrt{5})$

(c) $\frac{5}{3}(7\sqrt{7} - 5\sqrt{5})$


(d) $\frac{5}{3}(\sqrt{7} - \sqrt{5})$

(e) $\frac{2}{3}(\sqrt{7} - \sqrt{5})$

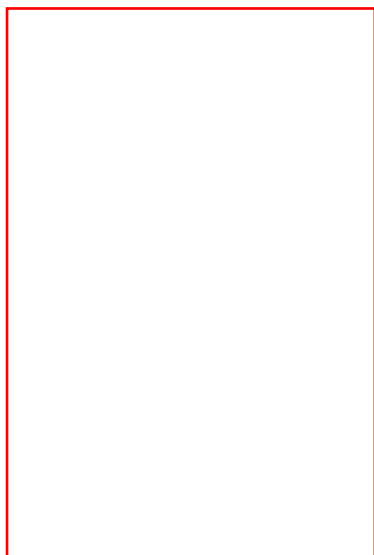
2. Using 3 approximating rectangles and midpoints, the approximation of the area under $f(x) = \frac{x+1}{x}$, $1 \leq x \leq 7$, is



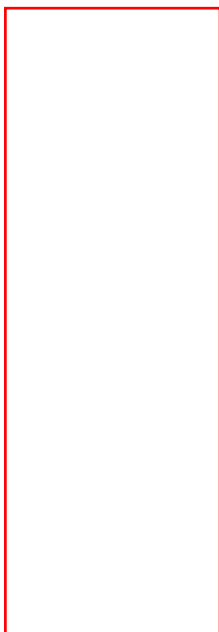
3. $\int_{\pi}^{3\pi/2} \sqrt{1 - \cos^2 t} \, dt =$



4. $\int_4^{10} \frac{t}{t^2 - 4} \, dt =$



5. The value of the definite integral $\int_0^{3/2} \sqrt{9 - 4x^2} \, dx$ is
(Hint: You may use areas)



6. $\lim_{n \rightarrow \infty} \sum_{k=1}^n \frac{n}{3n^2 + k^2} =$

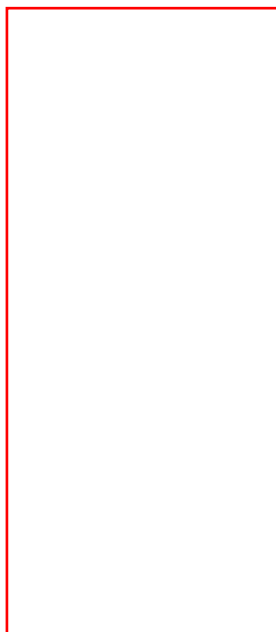
(a) $\frac{\pi}{6\sqrt{3}}$

(b) $\frac{\pi}{3\sqrt{3}}$

(c) $\frac{\pi}{4\sqrt{3}}$

(d) $\frac{1}{3\sqrt{3}}$

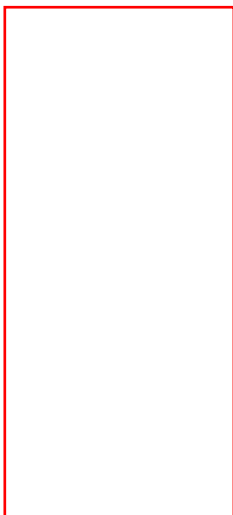
(e) $\frac{1}{6\sqrt{3}}$



7. Let f be a continuous function on $[-1, 4]$ such that:

$$\int_{-1}^2 f(t) dt = 5 \text{ and } \int_1^2 f(2t) dt = 2,$$

then $\int_{-1/3}^{4/3} f(3t) dt =$



8. The volume of the solid generated by revolving the region bounded by the curves $y = \cos x$ and $y = 0$, for $0 \leq x \leq \frac{\pi}{2}$, about the line $y = -1$ is given by



Set up

9. Let f be the function defined on R by

$$f(x) = \int_0^x (4 - t^2) e^{t^3} dt.$$

Which of the following statement is **FALSE**?

(a) f is decreasing on $[-2, 2]$

(b) $f(2) > 0$

(c) $f(-2) < 0$

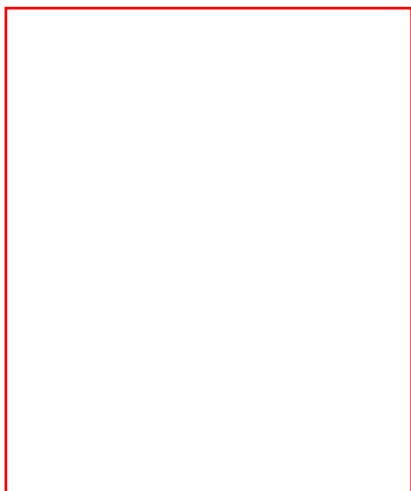
(d) $f(0) = 0$

(e) $f(1) > 0$

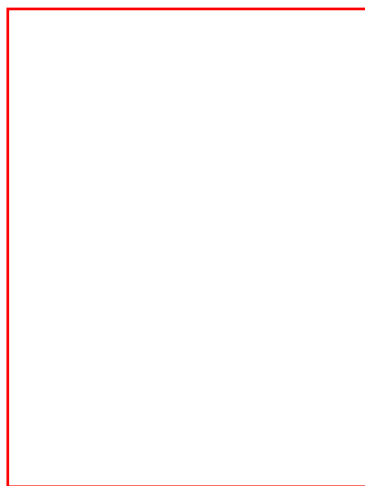
10. The area of the region bounded by the curves $y^2 = 2x + 1$ and $x + y = 1$ is equal to



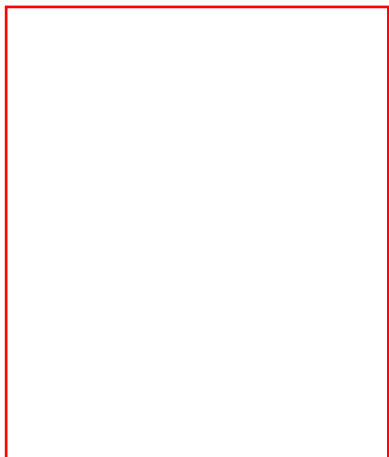
11. If $y = \int_{\cos x}^{\sin(3x)} \sqrt{t^2 + 3} dt$ then $\frac{dy}{dx}$ at $x = 0$ is equal to:



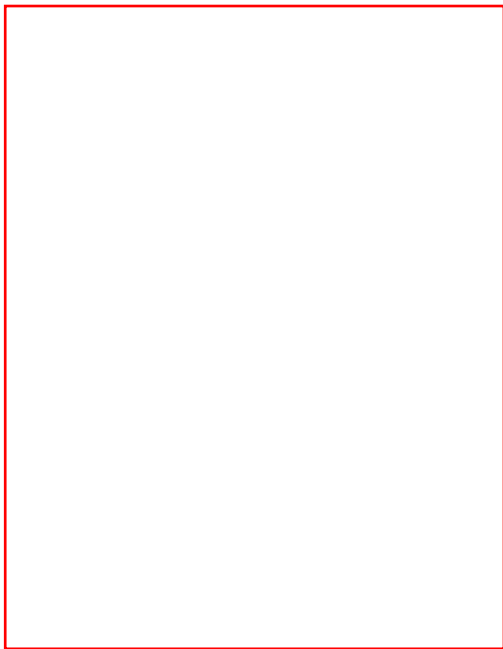
12. A particle moves along a line so that its velocity at time t is $v(t) = t^3 - 4t$ m/s. Then the distance traveled during the time period $0 \leq t \leq 4$ is



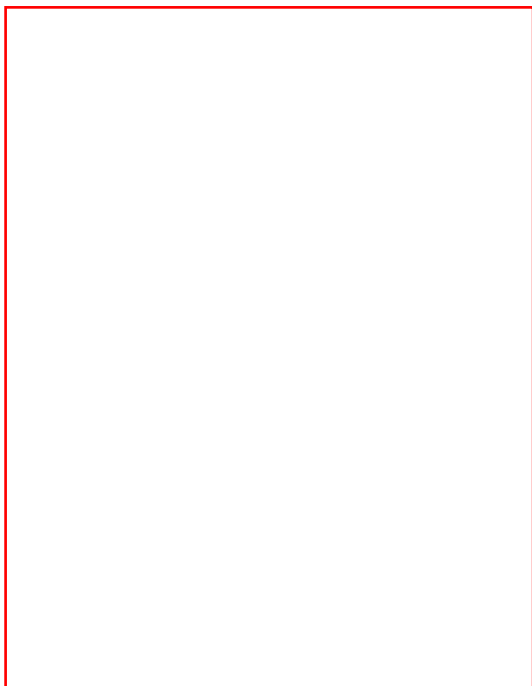
13. $\int_0^1 \frac{1}{(2 - \sqrt{x})^2} dx =$



14. $\int \frac{\sec^2\left(\frac{\pi}{x}\right)}{x^2} dx =$



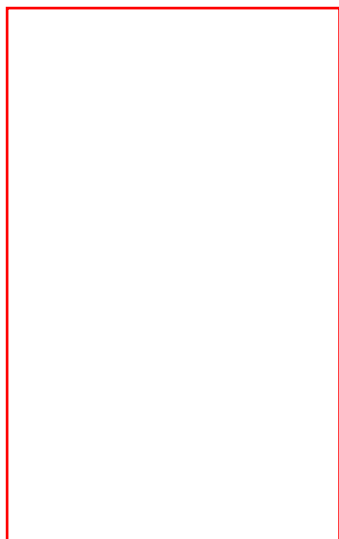
15. $\int \frac{(1 + \sqrt{t})^{2/3}}{\sqrt{t}} dt =$



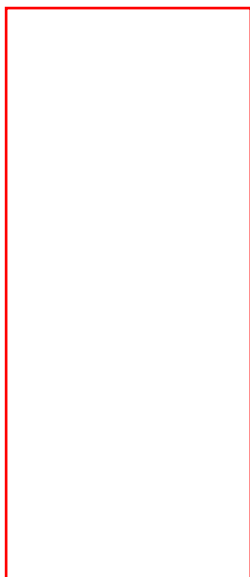
16. Let g be a differentiable function and let

$$f(x) = \int_0^{g(x)} \frac{t}{\sqrt{4 + 5t^2}} dt.$$

If $f'(1) = 1$, and $g'(1) = 3$, then $f(1) =$

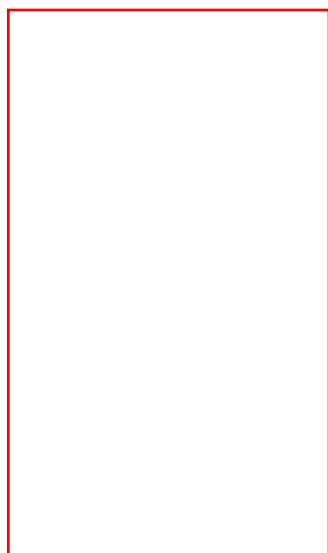


17. The base of a solid is a semi-circle of radius 1. Parallel cross-sections perpendicular to the base are squares with two of their vertices on the semi-circle. The volume of the solid is:



18. The volume of the solid obtained by rotating the region enclosed by the curves $y = x^2$ and $y = \sin\left(\frac{\pi x}{2}\right)$ around the x -axis is

(Hint: Use the identity $\sin^2 \theta = (1 - \cos 2\theta)/2$).



(e) $\frac{10}{10} - \frac{2}{2}$

19. Let m be an integer ≥ 2 and f be the function defined on $[2, \infty)$ by $f(x) = \int_2^x \frac{1}{t (\ln t)^m} dt$.

Which of the following statements is **FALSE**:

(a) $f(x) = \frac{2}{1-m} \left[\frac{1}{(\ln(x))^{m-1}} - \frac{1}{(\ln 2)^{m-1}} \right]$

(b) $f'(x) = \frac{1}{x(\ln x)^m}$

(c) $f(2) = 0$

(d) $f(3) > f\left(\frac{5}{2}\right)$

(e) f is continuous on $[2, \infty)$

20. Let f be a continuous increasing function defined on the interval $[a, b]$ such that $f(x) \geq 0, \forall x \in [a, b]$. Let R_n be the Riemann sum of f corresponding to a subdivision of $[a, b]$ into n subintervals using right end points, L_n is the corresponding sum using left end points. Let A be the area of the region under the graph $y = f(x)$. Which of the following statements is **FALSE**?

