

1. The area of the region in the first quadrant bounded by the graphs of $y = 7 \cos x$, $y = 7 \sin x$ and the y -axis is

- (a) $7\sqrt{2}$ (b) 14 (c) $7\sqrt{2} + 1$ (d) $7(\sqrt{2} - 1)$ (e) $\frac{7\sqrt{2}}{2}$

2. The base of a solid is the region bounded by $y = 2\sqrt{x}$, the x -axis, and $x = 2$. Each cross-section of the solid perpendicular to the x -axis is a square, with one side on the xy -plane. Which of the following expressions represents the volume of the solid?

- (a) $\int_0^2 (2\sqrt{x}) dx$ (b) $\int_0^2 (4x) dx$ (c) $\int_0^2 (2x) dx$
(d) $\int_0^1 (2\sqrt{x}) dx$ (e) $\int_0^1 (4x) dx$

3. Which of the following definite integrals gives the length of $y = e^{4x}$ on $0 \leq x \leq 2$?

- (a) $\int_0^2 \sqrt{1 + e^{8x}} dx$ (b) $\int_0^2 \sqrt{1 + 16e^{8x}} dx$ (c) $\int_0^2 \sqrt{x + 16e^{8x}} dx$
(d) $\int_0^2 \sqrt{x + e^{8x}} dx$ (e) $\int_0^2 \sqrt{e^{4x} + 16e^{8x}} dx$

4. A region is bounded by $y = \ln x$, the x -axis, and the line $x = e$. Order from smallest to largest the volumes of the solids formed by rotating the region about the following lines:

I. $y = 0$ II. $y = 1$ III. $y = 2$

- (a) $\text{III} < \text{II} < \text{I}$ (b) $\text{III} < \text{I} < \text{II}$ (c) $\text{II} < \text{I} < \text{III}$
 (d) $\text{I} < \text{II} < \text{III}$ (e) $\text{I} < \text{III} < \text{II}$

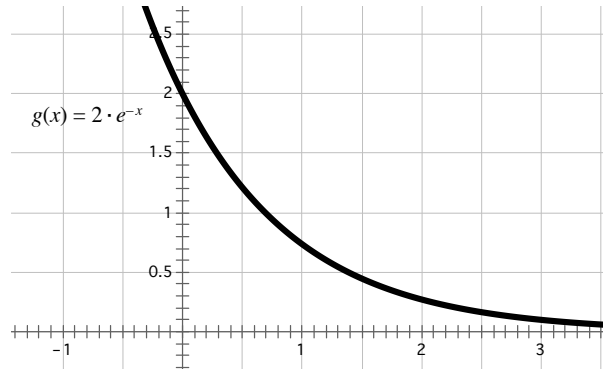
5. The region enclosed by the graphs of $y = x^3 - 1$ and $y = x - 1$ is revolved about the y -axis. The volume of this solid is

- (a) 0.360 (b) 0.972 (c) 1.944 (d) 3.032 (e) 6.462

6. The region bounded by the following graph $y = 3\sin x$ and the x -axis on $0 \leq x \leq \frac{\pi}{2}$, is rotated about the line $y = -2$. The volume of the solid is represented by

- (a) $\pi \int_0^{\frac{\pi}{2}} \left((3\sin x + 2)^2 - 4 \right) dx$
 (b) $2\pi \int_0^{\frac{\pi}{2}} (9\sin^2 x + 2) dx$
 (c) $\pi \int_0^{\frac{\pi}{2}} (9\sin^2 x - 4) dx$
 (d) $2\pi \int_0^{\frac{\pi}{2}} 9\sin(x + 2)^2 dx$
 (e) $2\pi \int_0^{\frac{\pi}{2}} (3\sin x + 2)^2 dx$

7. Let R be the region in the first quadrant enclosed by the graph of $y = 2e^{-x}$ and the line $x = k$.

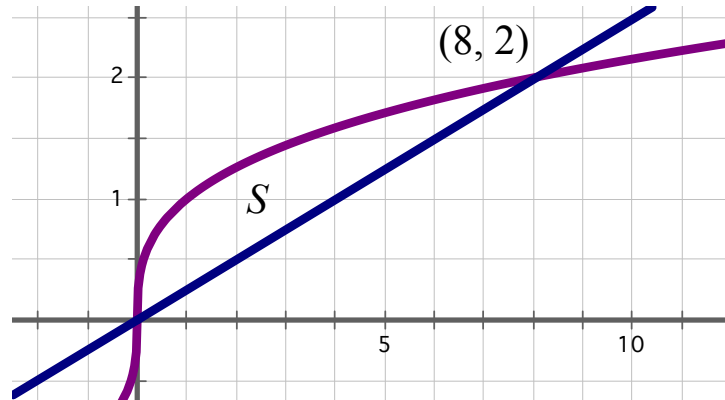


(a) Find the area of R . Show the integration steps.

(b) Find the volume, in terms of k , of the solid generated when R is revolved about the x -axis. Show the integration steps.

(c) If $k = 3$, find the volume of the solid where the cross-sections perpendicular to the x -axis are squares. Show the integration steps.

8. Let S be the region in the first quadrant enclosed by the graph of $y = \sqrt[3]{x}$ and the line $y = \frac{1}{4}x$, as shown below.



- a) Find the volume if the solid formed if S is rotated about the x -axis.
- b) Find the volume if the solid formed if S is rotated about the line $y = 3$.

c) Set up, but do not solve, the equation for the volume of the solid formed if S is rotated about the line $x = 8$.