Classroom Voting Questions: Calculus II

Section 8.2 Applications to Geometry

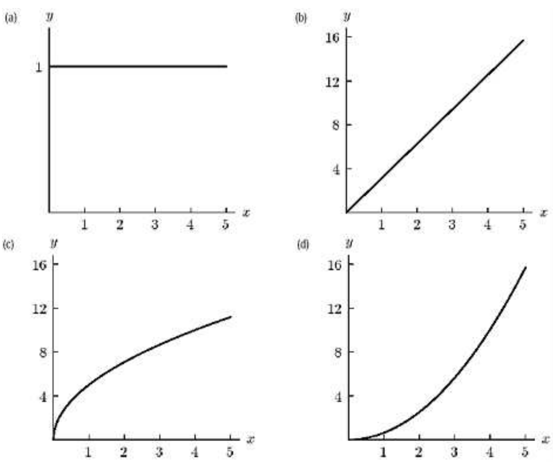
1. Find the area of the region R bounded by the graphs of $f(x) = x^2$ and $g(x) = \sqrt{x}$.

   (a) $\frac{1}{3}$
   (b) $\frac{7}{6}$
   (c) $-\frac{1}{3}$
   (d) None of the above

2. **True or False** The volume of the solid of revolution is the same whether a region is revolved around the x-axis or the y-axis.

   (a) True, and I am very confident
   (b) True, but I am not very confident
   (c) False, but I am not very confident
   (d) False, and I am very confident

3. Imagine taking the enclosed region in Figure 8.8 and rotating it about the x-axis. Which of the following graphs (a)-(d) represents the resulting volume as a function of x?



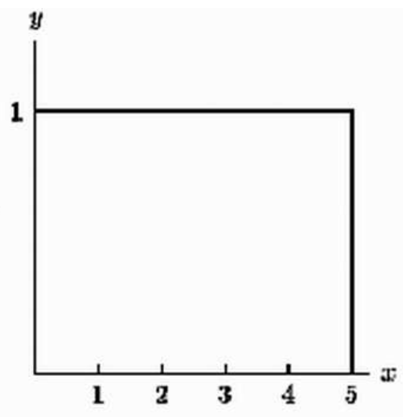
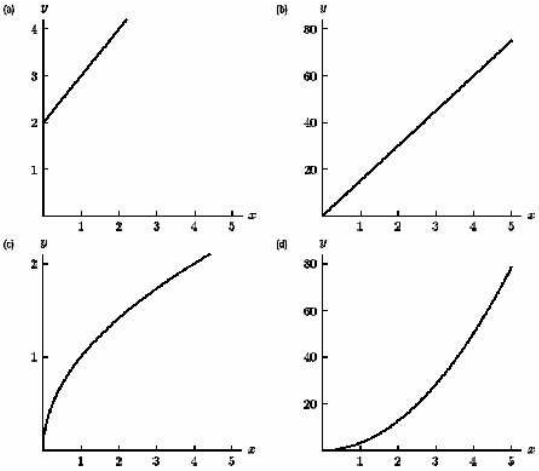


Figure 8.8

4. Imagine taking the enclosed region in Figure 8.9 and rotating it about the y-axis. Which of the following graphs (a)-(d) represents the resulting volume as a function of x?



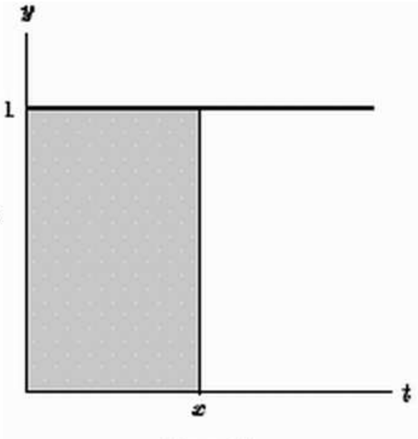


Figure 8.9

5. Imagine that the region between the graphs of f and g in Figure 8.10 is rotated about the x-axis to form a solid. Which of the following represents the volume of this solid?

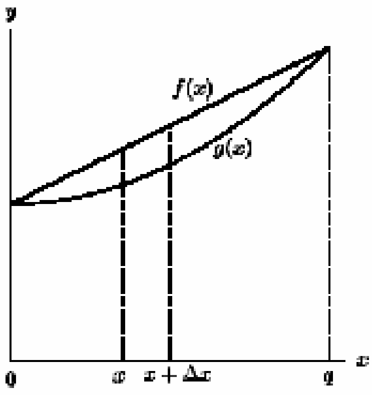


Figure 8.10

(a) $\int_0^q 2\pi x(f(x) - g(x))dx$

(b) $\int_0^q (f(x) - g(x))dx$

(c) $\int_0^q \pi(f(x) - g(x))^2 dx$

(d) $\int_0^q (\pi f^2(x) - \pi g^2(x))dx$

(e) $\int_0^q \pi x(f(x) - g(x))dx$

6. Imagine rotating the enclosed region in Figure 8.11 about three lines separately: the x-axis, the y-axis, and the vertical line at $x = 6$. This produces three different volumes. Which of the following lists those volumes in order from largest to smallest?

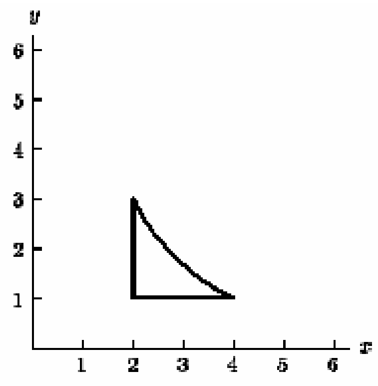


Figure 8.11

(a) x-axis; $x = 6$; y-axis

(b) y-axis; $x = 6$; x-axis

(c) $x = 6$; y-axis; x-axis

(d) $x = 6$; x-axis; y-axis

(e) x-axis; y-axis; $x = 6$

(f) y-axis; x-axis; $x = 6$

7. Let R be the region bounded by the graph of $f(x) = x$, the line $x = 1$, and the x-axis. True or false: The volume of the solid generated when R is revolved about the line $x = 3$ is given by $\int_0^1 2\pi x(3 - x)dx$.

   (a) True, and I am very confident.

   (b) True, but I am not very confident.

   (c) False, but I am not very confident.

   (d) False, and am very confident.

8. Let R be the region bounded by the graph of $y = x$, the line $y = 1$, and the y-axis. If the shell method is used to determine the volume of the solid generated when R is revolved about the $y-$axis, what integral is obtained?

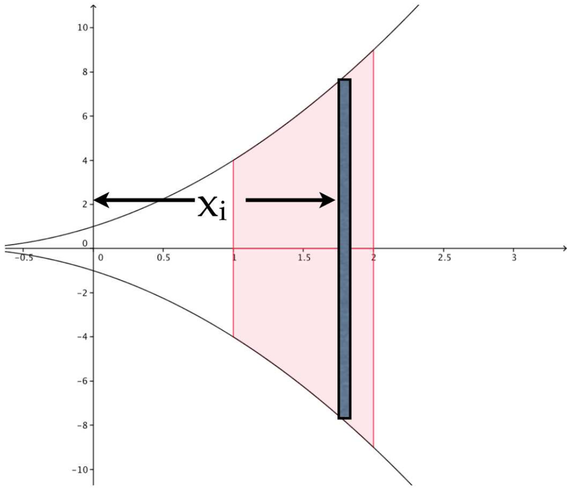
   (a) $\int_0^1 \pi y^2 dy$

   (b) $\int_0^1 2\pi x^2 dx$

   (c) $\int_0^1 2\pi x(1 - x)dx$

   (d) None of the above

9. The figure below shows the graph of $y = (x+1)^2$ rotated around the x-axis.



The volume of the approximating slice that is x_i units away from the origin is

(a) $\pi \dfrac{81x_i^2}{4}\Delta x$

(b) $\pi x_i^2 \Delta x$

(c) $\pi (x_i+1)^2 \Delta x$

(d) $\pi (x_i+1)^4 \Delta x$

10. An integral that would calculate the volume of the solid obtained by revolving the graph of $y = (x+1)^2$ from $x = 1$ to $x = 2$ around the y-axis is:

(a) $\int_1^2 \pi \left(\sqrt{x}-1\right)^2 \, dx$

(b) $\int_4^9 \pi \left(x+1\right)^4 \, dx$

(c) $\int_1^2 \pi \left(\sqrt{y}-1\right)^2 \, dy$

(d) $\int_4^9 \pi \left(\sqrt{y}-1\right)^2 \, dy$

11. The length of the graph of $y = \sin(x^2)$ from $x = 0$ to $x = 2\pi$ is calculated by

(a) $\int_0^{2\pi} (1+\sin(x^2))\, dx$

(b) $\int_0^{2\pi} \sqrt{1+\sin(x^2)}\, dx$

(c) $\int_0^{2\pi} \sqrt{1+(2x\sin(x^2))^2}\, dx$

(d) $\int_0^{2\pi} \sqrt{1+(2x\cos(x^2))^2}\, dx$