Unit 6 Lessons 1-3 AP Classroom Practice

1) Let R be the region in the first quadrant bounded above by the graph of $y = \frac{7}{3}x + 1$ and bounded below by the graph of $y = 2^x$ for $0 \leq x \leq 3$. Which of the following definite integrals gives the area of region R?

I. $\int_0^3 \left(\left(\frac{7}{3}x + 1 \right) - 2^x \right) dx$

II. $\int_0^3 \left(\frac{\ln y}{\ln 2} - \frac{3}{7}\left(y - 1 \right) \right) dy$

III. $\int_1^8 \left(\frac{\ln y}{\ln 2} - \frac{3}{7}\left(y - 1 \right) \right) dy$

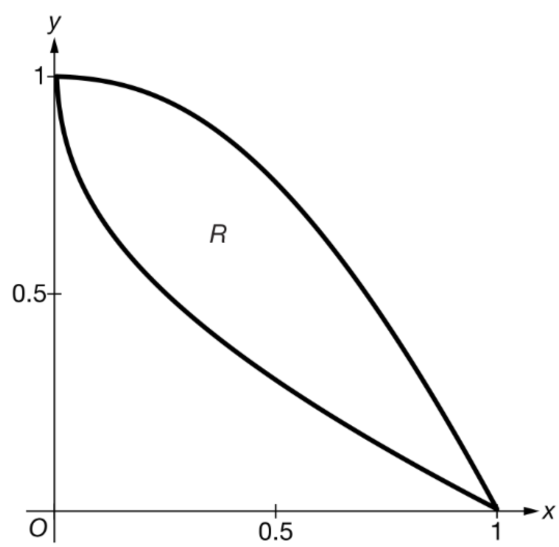
(A) None

(B) I only

(C) I and II only

(D) I and III only

2)



Let R be the region in the first quadrant bounded above by the graph of $y = 1 - x^2$ and below by the graph of $y = 1 - \sqrt{x}$, as shown in the figure above. What is the area of the region?

A) -1 B) 1/6 C) 1/3 D) 1

3) What is the area of the region in the first quadrant bounded on the left by the graph of $x = \frac{y^2}{2}$ and on the right by the graph of $x = 3y - 4$ for $2 \leq y \leq 4$?

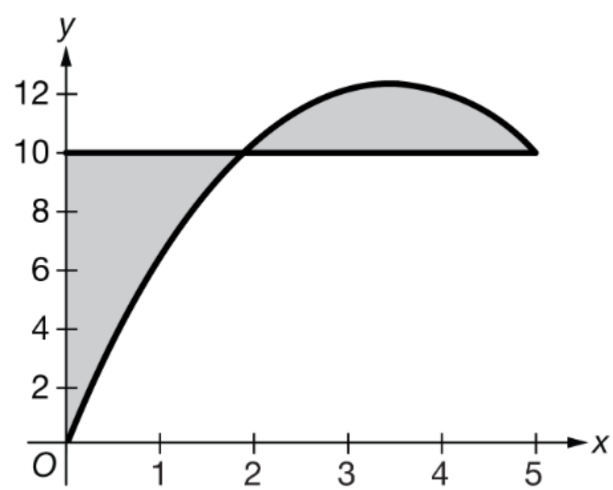
(A) $10 - \frac{56}{6}$

(B) $10 + \frac{56}{6}$

(C) $\frac{720}{8} - \frac{112}{3}$

(D) $\frac{504}{6} - \frac{192}{2} + 30$

4)



The figure above shows the graph of $y = 7x - x^2$ and the line $y = 10$ for $0 \leq x \leq 5$. Which of the following gives the sum of the areas of the shaded regions?

(A) $50 - \frac{175}{2} + \frac{125}{3}$

(B) $\frac{175}{2} - \frac{117}{3} - 44$

(C) $\frac{175}{2} - \frac{109}{3} - 38$

(D) $\frac{175}{2} - \frac{125}{3} + 50$

5) Graphing Calculator Needed

The base of a solid is the region in the first quadrant bounded by the graph of $y = \cos x$ and the x- and y-axes for $0 \le x \le \frac{\pi}{2}$. For the solid, each cross section perpendicular to the y-axis is a rectangle whose height is four times its width in the xy-plane. What is the volume of the solid?

(A) 0.285

(B) 3.142

(C) 4.000

(D) 4.566

6) The base of a solid is the region in the first quadrant between the graph of $y = x^3$ and the x-axis for $0 \le x \le 1$. For the solid, each cross section perpendicular to the x-axis is a semicircle. What is the volume of the solid?

(A) $\frac{\pi}{56}$

(B) $\frac{\pi}{32}$

(C) $\frac{\pi}{16}$

(D) $\frac{\pi}{14}$

7) Let R be the region in the first quadrant bounded by the graph of $y = x^2$, the line $x = 4$, and the x-axis. R is the base of a solid whose cross sections perpendicular to the x-axis are equilateral triangles. What is the volume of the solid?

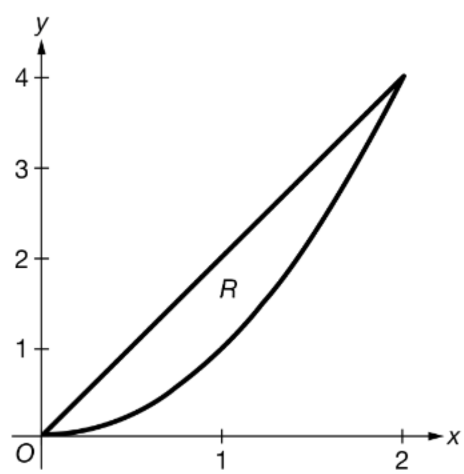
(A) $\frac{16}{3}\sqrt{3}$

(B) $\frac{256}{5}\sqrt{3}$

(C) $\frac{512}{5}$

(D) $\frac{1024}{5}\pi$

8) Graphing Calculator Needed



Let R be the region in the first quadrant bounded by the graphs of $y = x^2$ and $y = 2x$, as shown in the figure above. The region R is the base of a solid. For the solid, each cross section perpendicular to the y-axis is a square. What is the volume of the solid?

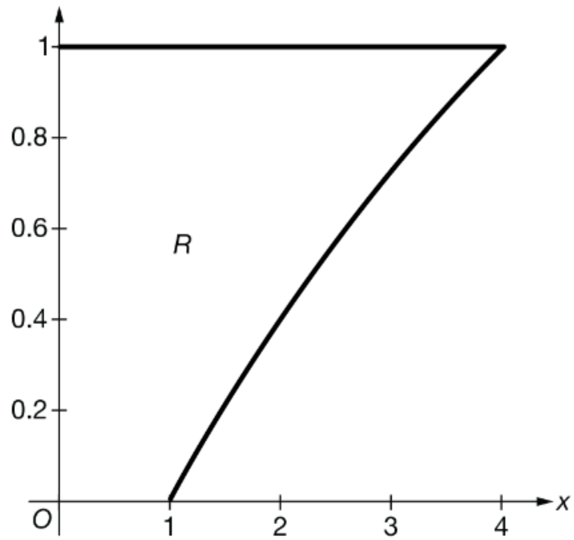
(A) 0.404

(B) 0.533

(C) 1.333

(D) 2.667

9)



Let R be the region in the first quadrant bounded by the x- and y-axes, the horizontal line $y = 1$, and the graph of $y = \sqrt{x - 1}$, as shown in the figure above. What is the volume of the solid generated when region R is revolved about the y-axis?

(A) $\frac{7\pi}{3}$

(B) $\frac{31\pi}{5}$

(C) 31π

(D) 155π

10) What is the volume of the solid generated when the region in the first quadrant bounded by the graph of $y = e^x$, the x-axis, and the vertical line $x = \ln 2$ is revolved about the x-axis?

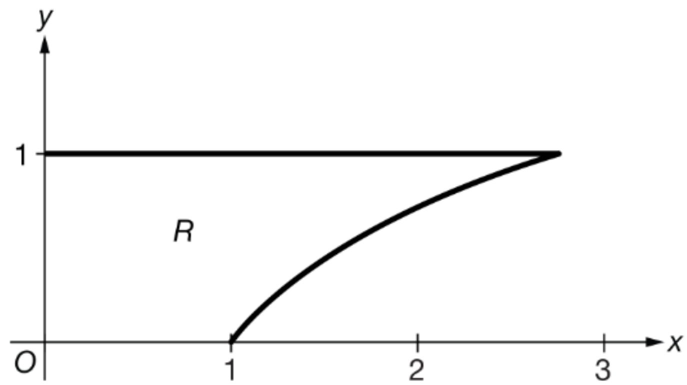
(A) π

(B) $\frac{3\pi}{2}$

(C) 3π

(D) 6π

11)



Let R be the region in the first quadrant bounded by the x- and y-axes, the horizontal line $y = 1$, and the graph of $y = \ln x$, as shown in the figure above. What is the volume of the solid generated when region R is revolved about the y-axis?

(A) $\pi\,(e - 1)$

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

(C) $\pi\left(e^2 - 1\right)$

(D) $2\pi\left(e^2 - 1\right)$

12) Let R be the region in the first quadrant bounded by the graph of $y = \tan x$, the x-axis, and the vertical line $x = 1$. Which of the following gives the volume of the solid generated when region R is revolved about the vertical line $x = 1$?

(A) $\pi \int_0^{\tan 1} (1 - \arctan y)^2 dy$

(B) $\pi \int_0^{1} (1 - \arctan y)^2 dy$

(C) $\pi \int_0^{\tan 1} (1 - \arctan y) dy$

(D) $\pi \int_0^{1} \left(1^2 - (\arctan y)^2\right) dy$

13) What is the volume of the solid generated when the region bounded by the graph of $y = x^3$, the vertical line $x = 4$, and the horizontal line $y = 8$ is revolved about the horizontal line $y = 8$?

(A) $\pi \int_2^4 (x^3 - 8)\,dx$

(B) $\pi \int_2^4 (x^6 - 64)\,dx$

(C) $\pi \int_2^4 (x^3 - 8)^2\,dx$

(D) $\pi \int_2^4 (x^3 + 8)^2\,dx$

14) Let M be the region in the first quadrant bounded above by the graph of $y = 3x$ and below by the graph of $y = x^2$. Which of the following gives the volume of the solid generated when region M is revolved about the vertical line $x = -3$?

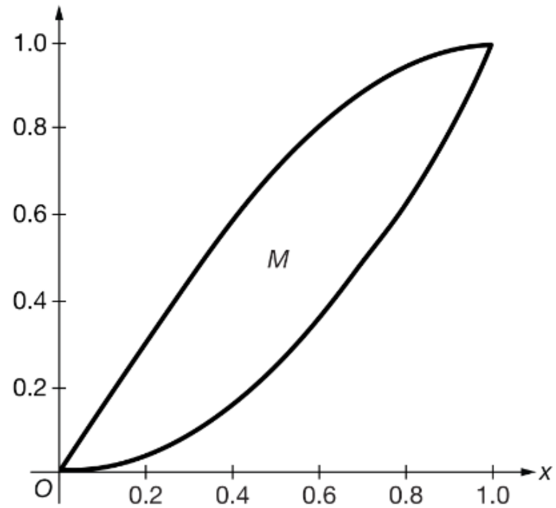
(A) $\pi \int_0^9 \left(\left(\sqrt{y} + 3\right) - \left(\frac{y}{3} + 3\right)\right)^2 dy$

(B) $\pi \int_0^9 \left(\sqrt{y} - \frac{y}{3}\right) dy$

(C) $\pi \int_0^9 \left(\left(\sqrt{y}\right)^2 - \left(\frac{y}{3}\right)^2\right) dy$

(D) $\pi \int_0^9 \left(\left(\sqrt{y} + 3\right)^2 - \left(\frac{y}{3} + 3\right)^2\right) dy$

15) Graphing Calculator Needed



Let M be the region in the first quadrant bounded by the graphs of $y = \sin\left(\frac{\pi x}{2}\right)$ and $y = x^2$. What is the volume of the solid generated when region M is revolved around the vertical line $x = 2$?

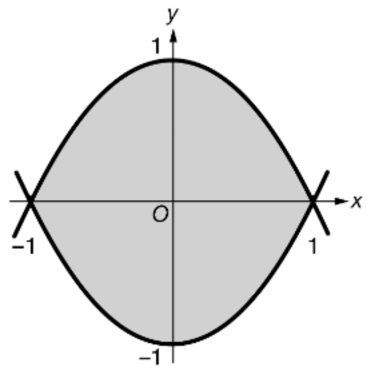
(A) 0.308

(B) 0.953

(C) 0.976

(D) 2.836

16)



Let R be the region bounded above by the graph of $y = 1 - x^2$ and below by the graph of $y = x^2 - 1$, for $-1 \le x \le 1$, as shaded in the figure above. What is the volume of the solid generated when region R is revolved about the horizontal line $y = 3$?

Ⓐ $\frac{64\pi}{15}$

Ⓑ $\frac{8\pi}{3}$

Ⓒ 12π

Ⓓ 16π