# AP® Exam Practice Questions

See LarsonCalculus.com for worked-out solutions to these questions.

## What You Need to Know

- The shell method is not required on the AP® Exam, but some free-response questions may be solvable by the shell method in addition to the disk method.
- The shell method is particularly advantageous when it is difficult to express one variable in terms of the other and when more than one integral is required to find a volume.
- On the AP® Calculus BC Exam, you may need to use the concept of arc length to find the perimeter of a given region.
- When limits of integration are irrational numbers, you can assign variables to represent each limit of integration. You can then write the correct integral expression using the variables, instead of writing out each integral in its entirety. This will help you save time.
- You may be asked to set up the correct integral for a problem but not to evaluate the integral.

## Practice Questions

**Section 1, Part A, Multiple Choice, No Technology**

**1.** What is the area of the region bounded by the $y$-axis, the line $y = e$, and the graph of the function $y = e^{3x}$?

(A) $\frac{1}{3}$ (B) $e^{3e} - \frac{1}{3}$

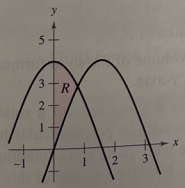
(C) $1 - \frac{2}{3}e$ (D) $3 - \frac{8}{3}e$

**2.** What is the area enclosed by the curves $y = x^3 - 7x^2 + 12x + 4$ and $y = 2x + 4$?

(A) $\frac{125}{12}$ (B) $\frac{63}{4}$

(C) $\frac{253}{12}$ (D) $\frac{445}{12}$

**In Exercises 3 and 4, let $R$ be the region bounded by the graphs of $y = 4\cos x$, $y = 4\sin x$, and the $y$-axis, as shown in the figure.**




**3.** Which expression represents the area of $R$?

(A) $4(\sqrt{2} - 1)$

(B) $\sqrt{2} - 1$

(C) $4(\sqrt{3} - 1)$

(D) $2\sqrt{2} - 1$

**4.** The horizontal line $y = 2$ splits the region $R$ into two parts. What is the area of the part of $R$ that is below this horizontal line?

(A) $\frac{2\pi}{3} - 2$ (B) $\frac{\pi}{3} + 2\sqrt{3} - 4$

(C) $\frac{2\pi}{3} + 2$ (D) $\frac{\pi}{3} + 2\sqrt{3}$

**5.** What is the area of the region bounded by the curves $x = y^2 - 4y$ and $y = -x + 4$?

(A) $\frac{95}{6}$ (B) 18

(C) $\frac{56}{3}$ (D) $\frac{125}{6}$

**6.** Which of the following integrals gives the length of the graph of $y = \ln(\sec x)$ from $x = 0$ to $x = \pi/4$?

(A) $\int_0^{\pi/4} \sec^2 x\, dx$ (B) $\int_0^{\pi/4} \sec x\, dx$

(C) $\int_0^{\pi/4} \sec x \tan x\, dx$ (D) $\int_0^{\pi/4} \sqrt{1 + \cos^2 x}\, dx$

**7.** Which of the following integrals gives the length of the graph of $y = 4e^{0.5x}$ from $x = 1$ to $x = 4$?

(A) $\int_1^4 \sqrt{1 + 4e^x}\, dx$ (B) $\int_1^4 \sqrt{1 + 16e^x}\, dx$

(C) $\int_1^4 \sqrt{1 + 2e^{0.5x}}\, dx$ (D) $\int_1^4 \sqrt{x + 16e^x}\, dx$

**8.** What is the arc length of the graph of $y = \frac{2}{3}x^{3/2}$ from $x = 3$ to $x = 8$?

(A) $\frac{32}{3}$ (B) $\frac{38}{3}$

(C) $\frac{40}{3}$ (D) 28