AP Calculus BC ’13-14

Chapter 7 (Volume) Test

Name:

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1. The volume of the solid generated by rotating about the x-axis the region enclosed by $y = 3x^2$ and $y = 6x$ is given by

(A) $\pi\int_0^3 \left(6x - 3x^2\right)^2 dx$ (B) $\pi\int_0^2 \left(6x - 3x^2\right)^2 dx$

(C) $\pi\int_0^2 \left(9x^4 - 36x^2\right) dx$ (D) $\pi\int_0^2 \left(36x^2 - 9x^4\right) dx$

(E) $\pi\int_0^2 \left(6x - 3x^2\right) dx$

2. Let R be the region in the first quadrant bounded by $y = 2\tan^{-1} x$ and $y = x$. What is the volume of the solid generated when R is rotated about the x-axis?

(A) 1.21 (B) 2.28 (C) 2.698 (D) 6.66 (E) 7.15

3. Which of the following integrals gives the length of the graph $y = Arc\sin\frac{x}{2}$ from $x = a$ to $x = b$

(A) $\int_a^b \sqrt{1 - \frac{1}{\sqrt{4 - x^2}}}\, dx$ (B) $\int_a^b \sqrt{1 + \frac{1}{\sqrt{4 - x^2}}}\, dx$

(C) $\int_a^b \sqrt{1 - \frac{1}{4 - x^2}}\, dx$ (D) $\int_a^b \sqrt{1 + \frac{1}{4 - x^2}}\, dx$

(E) $\int_a^b \left(1 + \frac{1}{4 - x^2}\right) dx$

4. A region is bounded by $y = \frac{1}{x^2}$, the x-axis, the line $x = m$, and the line $x = 2m$, where $m > 0$. A solid is formed by revolving the region about the *x*-axis. The volume of the solid

(a) is independent of *m*.

(b) increases as *m* increases.

(c) decreases as *m* increases.

(d) increases until $m = \frac{1}{2}$, then decreases.

(e) is none of the above

5. Let R be the region bounded by $y = 3\sin x$ on $0 \le x \le \frac{\pi}{2}$. Which of the following integrals gives the volume of the solid generated when R is rotated the line $y = -2$?

(a) $\pi \int_0^{\pi/2} (3\sin x + 2)^2 \, dx$

(b) $2\pi \int_0^{\pi/2} (9\sin^2 x + 2) \, dx$

(c) $\pi \int_0^{\pi/2} (9\sin^2 x - 4) \, dx$

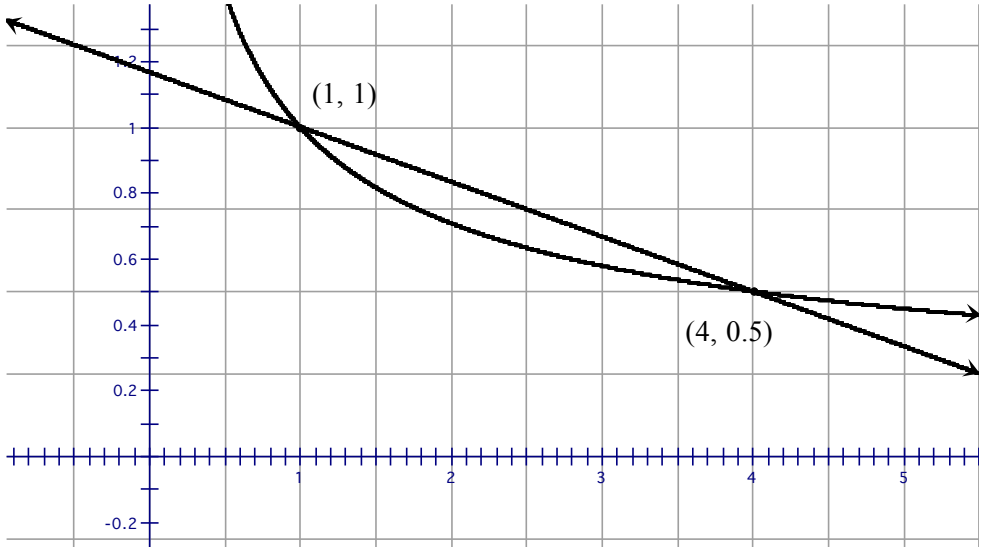
(d) $2\pi \int_0^{\pi/2} 9\sin(x + 2)^2 \, dx$

(e) $2\pi \int_0^{\pi/2} (3\sin x + 2)^2 \, dx$

6. The base of a solid is the region in the first quadrant bounded by $y = \sqrt{2\cos x}$ for $0 < x < \frac{\pi}{2}$. If each cross-section of the solid perpendicular to the *x*-axis is a square, the volume of the solid is

(a) 0 (b) 1 (c) 2 (d) 3 (e) 4

7. R is the region bounded by the curve $y = \frac{1}{\sqrt{x}}$ and the line $y = -\frac{1}{6}x + \frac{7}{6}$.

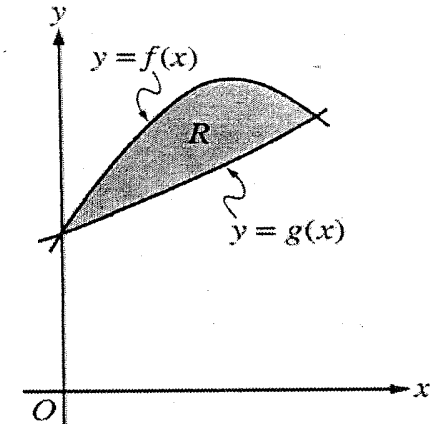


(a) Find the area of R. Show the integration steps.

(b) Find the volume of the solid generated when R is revolved about the line $y = 1$. Show the integration steps.

(c) Find the volume of the solid generated when R is revolved about the line $x = 4$. Show the integration steps.

8. Let f and g be the functions given by $f(x)=1+\sin 2x$ and $g(x)=e^{x/2}$. Let R be the shaded region in the first quadrant enclosed by the graphs of f and g as shown below.



(a) Find the perimeter of region R. Show the set-up before using Math 9.

(b) Find the volume of the solid generated when R is revolved about the x-axis. Show the set-up before using Math 9.

(c) Let the base of the solid be the region R. Find the volume of the solid where the cross-sections perpendicular to the x-axis are semicircles. Show the set-up before using Math 9.

End of

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