BC Calculus '16-17 name_____
Volume Test

Score_____

1. The area of the region enclosed by $y = x^2 - 4$ and $y = x - 4$ is given by

(a) $\int_0^1 \left(x - x^2\right) dx$ (b) $\int_0^1 \left(x^2 - x\right) dx$ (c) $\int_0^2 \left(x - x^2\right) dx$

(d) $\int_0^2 \left(x^2 - x\right) dx$ (e) $\int_0^4 \left(x^2 - x\right) dx$

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2. Which of the following integrals gives the length of the graph $y = \tan x$ between $x=a$ to $x=b$ if $0 < a < b < \frac{\pi}{2}$?

(a) $\int_a^b \sqrt{x^2 + \tan^2 x}\, dx$ (b) $\int_a^b \sqrt{x + \tan x}\, dx$

(c) $\int_a^b \sqrt{1 + \sec^2 x}\, dx$ (d) $\int_a^b \sqrt{1 + \tan^2 x}\, dx$

(e) $\int_a^b \sqrt{1 + \sec^4 x}\, dx$

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3. Let R be the region in the first quadrant bounded by $y = e^{x/2}$, $y = 1$ and $x = \ln 3$. What is the volume of the solid generated when R is rotated about the *x*-axis?

(a) 2.80 (b) 2.83 (c) 2.86 (d) 2.89 (e) 2.92

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4. A region is bounded by $y = \frac{1}{x}$, 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

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5. Let R be the region in the first quadrant bounded by $y = \sin^{-1} x$, the y-axis, and $y = \frac{\pi}{2}$. Which of the following integrals gives the volume of the solid generated when R is rotated about the y-axis?

(a) $\pi \int_0^{\pi/2} y^2 \, dy$ (b) $\pi \int_0^1 \left(\sin^{-1} x\right)^2 dx$

(c) $\pi \int_0^{\pi/2} \left(\sin^{-1} x\right)^2 dx$ (d) $\pi \int_0^{\pi/2} \left(\sin y\right)^2 dy$

(e) $\pi \int_0^1 \left(\sin y\right)^2 dy$

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

(a) $\frac{\pi}{4}$ (b) $\frac{\pi^2}{4}$ (c) $\frac{\pi}{2}$ (d) $\frac{\pi^2}{2}$ (e) 2

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7. Let T be the region bounded by $y = -x^3$ and $y = \sqrt{-8x}$.

a) Find the volume of the solid generated when T is rotated about the x – axis. Show the anti-differentiation steps.

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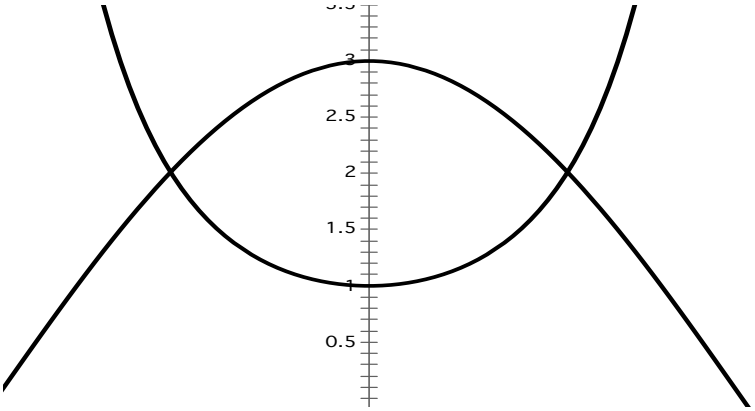
b) Find the volume of the solid generated when T is rotated about the y – axis. Show the anti-differentiation steps.



8. Let S be the region shown above bounded above by the graph of $y = 3\cos x$ and below the graph of $y = e^{x^2}$.

a) Find the volume of the solid generated when S is revolved about the *x*-axis.

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b) Let the base of the solid be the region S. Find the volume of the solid where the cross-sections perpendicular to the *x*-axis are rectangles which are twice as tall as they are wide.

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9. Let R be the region bounded by $y = x\tan^{-1}\left(\frac{x}{5}\right)$, and $x = 5$.

a) Find the volume of the solid generated when R is rotated about the line $y = -2$.

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b) Find $\frac{dy}{dx}$.

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c) Find the perimeter of region R.
