AB Calculus '19-20 Name ___________________________

Volume Practice Test

Calculator Allowed Score: _______________

1. What is the area enclosed by $y = \ln(2x+1)$ and $y = 2\sin x$?

a) 0.334

b) 0.661

c) 3.526

d) 0.825

e) 2.983

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2. A region is bounded by $y = \frac{2}{\sqrt{x}}$, the x-axis, the line $x = m$, and the line $x = 2m$, where $m > 0$. The area of this region:

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

a) $\pi \int_0^{\pi/2} y^2 \, dy$

b) $\pi \int_0^1 \left(\frac{\pi}{2} - \sin^{-1} y\right)^2 dy$

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

d) $\pi \int_0^1 (\sin x)^2 \, dx$

e) $\pi \int_0^{\pi/2} \left(\frac{\pi}{2} - \sin x\right)^2 dx$

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4. Which of the following integrals gives the length of the graph $y = \sin 2x$ from $x=a$ to $x=b$?

a) $\int_a^b \sqrt{1 + 4\sin^2 x \cos x} \, dx$

b) $\int_a^b \sqrt{1 + \sin^2 2x} \, dx$

c) $\int_a^b \sqrt{1 + 4\cos^2 2x} \, dx$

d) $\int_a^b \sqrt{1 + \cos^2 2x} \, dx$

e) $\int_a^b \sqrt{1 + 4\sin^2 x \cos^2 x} \, dx$

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5. For $t \geq 0$ hours, H is a differentiable function of t that gives the change in temperature, in degrees Celsius per hour, at an Arctic weather station. Which of the following is the best interpretation of $\int_0^t H(x)\,dx$?

a) The total change in temperature during the first t hours.
b) The total change in temperature during the first day.
c) The average rate at which the temperature changed during the first t hours.
d) The rate at which the temperature is changing during the first day.
e) The rate at which the temperature is changing at the end of the 24^{th} day.

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6. Let $\boldsymbol{R}$ represent the region in the first quadrant bounded by $y = -3x + 6$. Which expression gives the volume of the solid with base $\boldsymbol{R}$ whose cross-section perpendicular to the x-axis are semi-circles?

a) $\pi \int_0^2 (-3x+6)^2\,dx$

b) $\pi \int_0^6 \left(\frac{6-y}{3}\right)^2 dy$

c) $\frac{\pi}{4} \int_0^2 (-3x+6)^2\,dx$

d) $\frac{\pi}{8} \int_0^2 (-3x+6)^2\,dx$

e) $\frac{\pi}{2} \int_0^6 \left(\frac{6-y}{6}\right)^2 dy$

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7. What is the volume of the solid formed when the region bounded by $y = e^x - 1$, $y = 2$, and $x = 0$ is rotated around the y-axis?

a) 1.296

b) 3.233

c) 5.930

d) 10.354

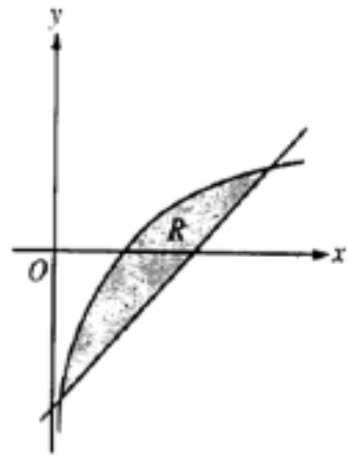
e) 25.199

8. Let ***S*** be the region bounded by $y = x^3$, $y = 8$, and $x = 0$.

a) Find the area of ***S.*** Show the setup.

b) Find the volume of the solid generated by revolving ***S*** around the *x*-axis. Show the anti-differentiation steps.

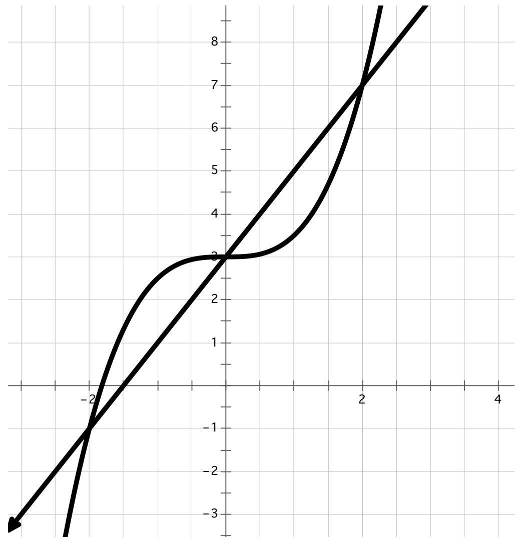
9. Let ***R*** be the region bounded by $y = \ln x$ and $y = x - 2$.



a) Find the volume of the solid whose base is ***R*** and whose cross-sections perpendicular to the <u>y-axis</u> are isosceles right triangles with the one leg is in the base.

b) Find the volume of the solid formed by revolving ***R*** around the line $y = 3$.

10. Let f and g be the functions given by $f(x)=\frac{1}{2}x^3+3$ and $g(x)=2x+3$. Let R be the two-part region enclosed by the graphs of f and g shown below.



(a) Find the area of region R. Do not use Math 9.

(b) 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.

(c) Find the volume of the solid generated when R is revolved about the y-axis.