Math 1B
Group Quiz 5
Wed Feb 13, 2008

Names: _____
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THIS IS A NO CALCULATOR QUIZ

[8 POINTS] Let R be the region bounded by $y = e^x$, $y = 2$ and $x = 0$. Write integrals for the volumes of the following solids. **DO NOT EVALUATE THE INTEGRALS. DO NOT USE DECIMAL APPROXIMATIONS.**

(a) R is revolved around the x-axis

$$\pi \int_0^{\ln 2} (4 - e^{2x})\, dx \quad \underline{\text{OR}} \quad 2\pi \int_1^2 y \ln y\, dy$$

(b) R is revolved around $y = 2$

$$\pi \int_0^{\ln 2} (2 - e^x)^2\, dx \quad \underline{\text{OR}} \quad 2\pi \int_1^2 (2 - y) \ln y\, dy$$

(c) R is revolved around $x = -2$

$$2\pi \int_0^{\ln 2} (x + 2)(2 - e^x)\, dx \quad \underline{\text{OR}} \quad \pi \int_1^2 ((2 + \ln y)^2 - 4)\, dy$$

(d) R is revolved around the y-axis

$$2\pi \int_0^{\ln 2} x(2 - e^x)\, dx \quad \underline{\text{OR}} \quad \pi \int_1^2 (\ln y)^2\, dy$$

(e) R is revolved around $y = 5$ **using the disk/washer method**

$$\pi \int_0^{\ln 2} ((5 - e^x)^2 - 9)\, dx$$

(f) R is revolved around $y = 5$ **using the shell method**

$$2\pi \int_1^2 (5 - y) \ln y\, dy$$

(g) R is revolved around $x = 2$ **using the disk/washer method**

$$\pi \int_1^2 (4 - (2 - \ln y)^2)\, dy$$

(h) R is revolved around $x = 2$ **using the shell method**

$$2\pi \int_0^{\ln 2} (2 - x)(2 - e^x)\, dx$$

[2 POINTS] The base of a solid is the region bounded by $y = x^2$ and $y = 6x - x^2$. Cross sections perpendicular to the x-axis are equilateral triangles. Write an integral for the volume of the solid. **DO NOT EVALUATE THE INTEGRAL.**

$$\int_0^3 \frac{\sqrt{3}}{4} \left(6x - x^2 - x^2\right)^2 dx \quad = \quad \frac{\sqrt{3}}{4} \int_0^3 \left(6x - 2x^2\right)^2 dx \quad = \quad \sqrt{3} \int_0^3 \left(3x - x^2\right)^2 dx$$

$\frac{1}{4}$ POINT FOR EACH UPPER LIMIT
LOWER LIMIT
INTEGRAND
$-\frac{1}{4}$ POINT EACH MISSING 6 π OR 2π OR dx OR dy

$\frac{1}{2}$ POINT FOR CONSTANT MULTIPLE
$\frac{1}{2}$ UPPER LIMIT
$\frac{1}{2}$ LOWER LIMIT
$\frac{1}{2}$ INTEGRAND
$-\frac{1}{2}$ POINT FOR [redacted] MISSING dx