Math 1B
Quiz 6
Fri May 30, 2008

What day of the month is your birthday ? ___ ___
What are the last 2 digits of your address ? ___ ___
What are the last 2 digits of your zip code ? ___ ___

THIS IS A NO CALCULATOR QUIZ

Write, BUT DO NOT COMPUTE, integrals for the volumes of the following solids.
You may use any method you wish.

[6 POINTS] The region bounded by $y = e^x$, $x = 2$, $y = 0$ and $x = 0$ is revolved about the line

[a] $y = -4$

$\frac{1}{2}\int_0^2 \pi\left((e^x+4)^2 - 16\right)dx$

OR $\int_0^1 2\pi(y+4)(2)\,dy + \int_1^{e^2} 2\pi(y+4)(2-\ln y)\,dy$

[b] $x = 0$

$\frac{1}{2}\int_0^2 2\pi x e^x\,dx$ OR $\int_0^1 4\pi\,dy + \int_1^{e^2} \pi\left(4^2 - (\ln y)^2\right)dy$

3/8 POINT EACH

[6 POINTS] The base of the solid is the region bounded by $y = x^2$ and $y = 4$. Cross sections perpendicular to the x-axis are

[a] semicircles

$\int_{-2}^{2} \frac{1}{8}\pi\left(4 - x^2\right)^2 dx$

[b] equilateral triangles

$\int_{-2}^{2} \frac{\sqrt{3}}{4}\left(4 - x^2\right)^2 dx$

1 POINT EACH

[6 POINTS] The region bounded by $y = \sqrt{x}$, $y = 2$ and $x = 0$ is revolved about the line

[a] $x = 5$

$\int_0^2 \pi\left(25 - (5-y^2)^2\right)dy$

OR $\int_0^4 2\pi(5-x)\left(2-\sqrt{x}\right)dx$

[b] $y = 2$

$\int_0^4 \pi\left(2-\sqrt{x}\right)^2 dx$

OR $\int_0^2 2\pi(2-y)(y^2)\,dy$

[2 POINTS] **MULTIPLE CHOICE (NO PARTIAL CREDIT)**

An MRI scan indicates that cross sectional areas of adjacent slices of a tumor are as given in the table below. Estimate the\ volume of the tumor.

x	0.0	0.2	0.4	0.6	0.8	1.0	1.2
$A(x)$	0.0	0.3	0.4	0.2	0.3	0.1	0.0

[A] $1.2\,(0.0 + 0.3 + 0.4 + 0.2 + 0.3 + 0.1 + 0.0)$

[B] $0.2\pi\,(0.0^2 + 0.3^2 + 0.4^2 + 0.2^2 + 0.3^2 + 0.1^2 + 0.0^2)$

[C] $\frac{0.2}{3}(0.0 + 2\times 0.3 + 4\times 0.4 + 2\times 0.2 + 4\times 0.3 + 2\times 0.1 + 0.0)$

[D] $\frac{0.2}{2}(0.0 + 2\times 0.3 + 2\times 0.4 + 2\times 0.2 + 2\times 0.3 + 2\times 0.1 + 0.0)$

LETTER OF CORRECT ANSWER: D

[2 BONUS POINTS] Sketch a region and an axis of revolution so the volume of the solid created is given by the integral $\int_0^1 \pi\left(4 - e^x\right)dx$.