Math 1B (7:30am – 8:20am)
Quiz 4 Version D
Fri May 6, 2011

What month is your birthday ? ___ ___
What are the first 2 digits of your address ? ___ ___
What are the last 2 digits of your zip code ? ___ ___
What are the last 2 digits of your DeAnza ID number ? ___ ___

SCORE: ___ / 30 POINTS

NO CALCULATORS ALLOWED

SHOW PROPER ALGEBRAIC WORK
USE PROPER NOTATION & SIMPLIFY ALL ANSWERS WHERE REASONABLE

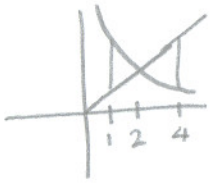
MULTIPLE CHOICE: CIRCLE THE CORRECT ANSWER **SCORE: ___ / 3 POINTS**

If you revolve the region defined by $y \geq x^2$, $y \leq 1$ around the line $y = 1$, the volume of the resulting solid is

$\int_{-1}^{1} \pi (1-x^2)^2 \, dx$

[a] $\frac{16\pi}{15}$ [b] $\frac{6\pi}{5}$ [c] $\frac{4\pi}{3}$ [d] $\frac{4\pi}{5}$ [e] $\frac{14\pi}{15}$

Find the area between the curves $y = \frac{4}{x^2}$ and $y = \frac{x}{2}$ on the interval $1 \leq x \leq 4$. **SCORE: ___ / 6 POINTS**



$\frac{4}{x^2} = \frac{x}{2}$

$8 = x^3$

$x = 2$

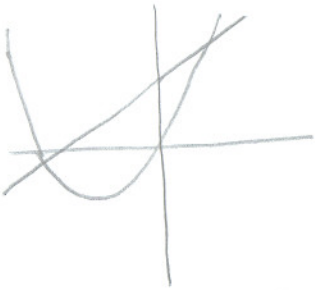
$\int_1^2 \left(\frac{4}{x^2} - \frac{x}{2}\right) dx + \int_2^4 \left(\frac{x}{2} - \frac{4}{x^2}\right) dx$

$= \left(-4x^{-1} - \frac{1}{4}x^2\right)\Big|_1^2 + \left(\frac{1}{4}x^2 + 4x^{-1}\right)\Big|_2^4$

$= \left(-\frac{4}{2} - \frac{4}{4}\right) - \left(-\frac{4}{1} - \frac{1}{4}\right) + \left(\frac{16}{4} + \frac{4}{4}\right) - \left(\frac{4}{4} + \frac{4}{2}\right)$

$= \frac{13}{4}$

The base of a solid is the region bounded by $y = x^2 + 3x$ and $y = 2x + 6$. Cross sections perpendicular to the $x-$axis are equilateral triangles. Write, **BUT DO NOT EVALUATE**, an integral (or sum of integrals) for the volume of the solid. **SCORE: ___ / 6 POINTS**



$x^2 + 3x = 2x + 6$

$x^2 + x - 6 = 0$

$(x+3)(x-2) = 0$

$x = -3, 2$

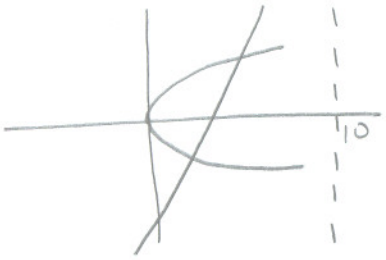
$\int_{-3}^{2} \frac{\sqrt{3}}{4} \left(\frac{2x+6-(x^2+3x)}{2}\right)^2 dx$

OR

$\int_{-3}^{2} \frac{\sqrt{3}}{4} (6 - x - x^2)^2 \, dx$

The region bounded by $x = y^2$ and $y = \dfrac{x-3}{2}$ is revolved around the line $x = 10$. **SCORE: ___ / 6 POINTS**

Write, **BUT DO NOT EVALUATE**, an integral (or sum of integrals) for the volume of the solid.



$$\int_{-1}^{3} \pi \left[(10-y^2)^2 - (10-(2y+3))^2 \right] dy$$

OR

$$\int_{-1}^{3} \pi \left[(10-y^2)^2 - (7-2y)^2 \right] dy$$

$y = \frac{x-3}{2} \Rightarrow x = 2y+3$

$y^2 = 2y+3$

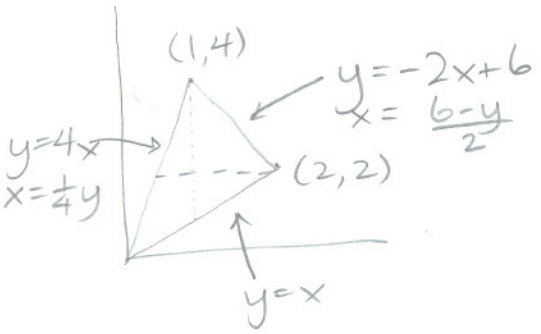
$y^2 - 2y - 3 = 0$

$(y-3)(y+1) = 0$

$y = -1, 3$

Consider the triangle with vertices $(0, 0)$, $(1, 4)$ and $(2, 2)$. **SCORE: ___ / 9 POINTS**

[a] Write, **BUT DO NOT EVALUATE**, a dx integral (or sum of integrals) for the area of the triangle.
Your integrand must NOT use absolute values.



$$\int_0^1 (4x - x)\,dx + \int_1^2 (-2x+6-x)\,dx$$

OR

$$\int_0^1 3x\,dx + \int_1^2 (6-3x)\,dx$$

[b] Write, **BUT DO NOT EVALUATE**, a dy integral (or sum of integrals) for the area of the triangle.
Your integrand must NOT use absolute values.

$$\int_0^2 \left(y - \tfrac{1}{4}y\right) dy + \int_2^4 \left(\frac{6-y}{2} - \tfrac{1}{4}y\right) dy$$

OR

$$\int_0^2 \frac{3}{4}y\,dy + \int_2^4 \frac{12-3y}{4}\,dy$$