Math 152 - Fall 2013 - Quiz #2 **Score:** _____ out of 10.

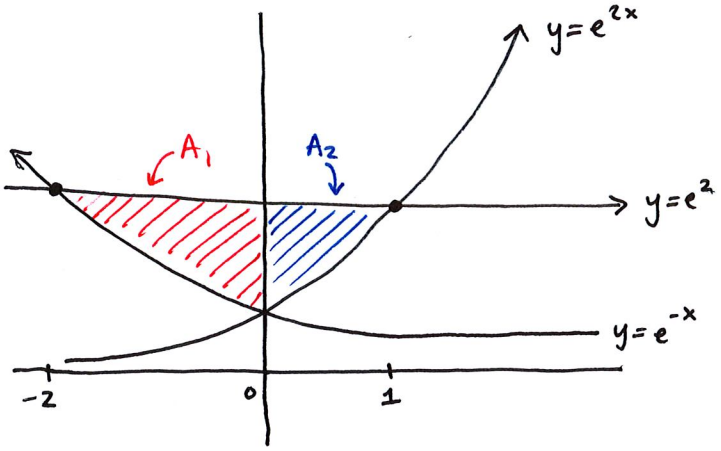
Name: Key

Show all work clearly and in order. Please box your answers.

SOLVE ONE OF THE FOLLOWING:

Please indicate which problem you do NOT want me to grade by putting a GIANT X through it, otherwise I will grade the first problem worked on:

1. Find the area of the region bounded by $y = e^{2x}$, $y = e^{-x}$ and $y = e^2$. Note: **you must also draw a clear picture to recieve full credit.**



points of intersection: $e^2 = e^{-x}$ | $e^2 = e^{2x}$

$2 = -x$ | $2 = 2x$

$x = -2$ | $x = 1$

$$\text{Area} = A_1 + A_2$$

$$= \int_{-2}^{0} (e^2 - e^{-x})\,dx + \int_{0}^{1} (e^2 - e^{2x})\,dx$$

$$= \left[(e^2)x + e^{-x}\right]_{-2}^{0} + \left[(e^2)x - \frac{e^{2x}}{2}\right]_{0}^{1}$$

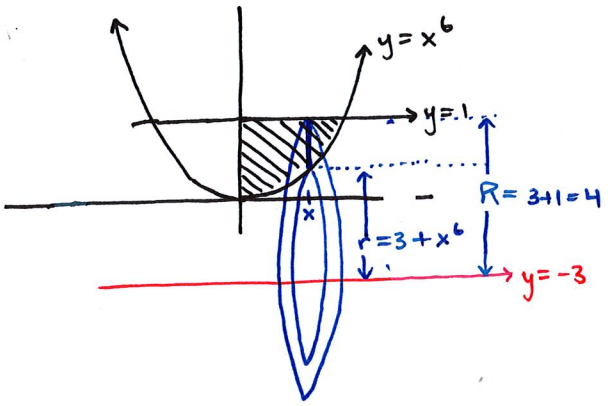
$$= \left[\left((e^2)(0) + e^0\right) - \left(e^2(-2) + e^2\right)\right] + \left[\left((e^2)(1) - \frac{e^2}{2}\right) - \left(0 - \frac{1}{2}\right)\right]$$

$$= \left[e^2 + 1\right] + \left[\frac{e^2}{2} + \frac{1}{2}\right]$$

$$= \boxed{\frac{3}{2}e^2 + \frac{3}{2}} \approx 12.5836$$

2. **Set up but do not evaluate the integral** for the volume of the solid obtained by rotating the region bounded by $y = x^6$, $y = 1$ and the y-axis with $x \geq 0$ (so the region is in the first quadrant) about the line $y = -3$. Note: **you must also draw a clear picture to recieve full credit.**

SOL 1: (Washer / Disk Method)



r = inner radius $= 3 + x^6$

R = outer radius $= 3 + 1 = 4$

pts. of intersection

$1 = x^6$

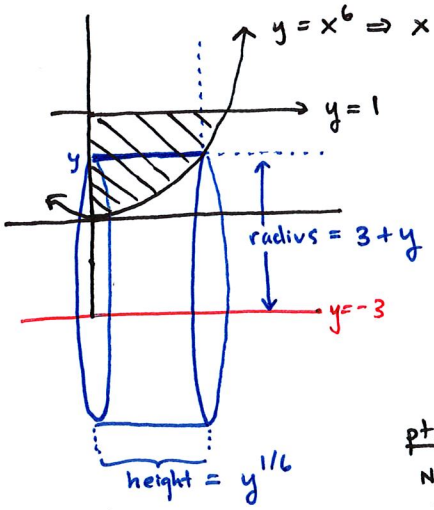
$\pm 1^{1/6} = x$

$x = \pm 1$

Only $x = +1$ is in the right region)

$$V = \int_0^1 \left[\pi(4)^2 - \pi(3 + x^6)^2\right] dx$$

SOL 2: (Shell Method)



pts. of intersection:

No need, clearly the smallest y can be is 0 and the largest y can be is 1. ($y=1$ is given)

height $= y^{1/6}$

radius $= 3 + y$

$$V = \int_0^1 2\pi(3 + y)(y^{1/6})\,dy$$