Dawson College: Calculus II: 201-NYB-05 05

April 8, 2011

Last Name: SOLUTIONS

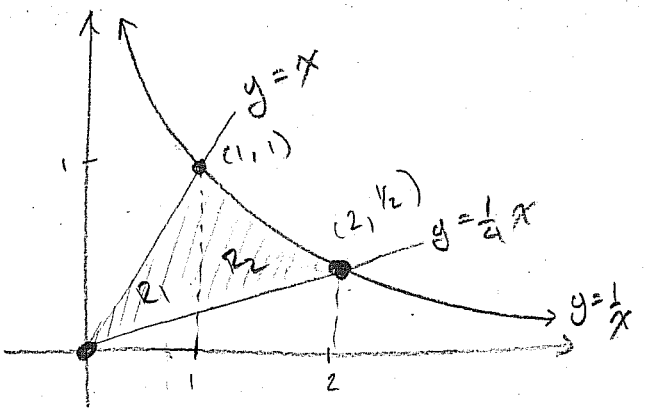
First Name: _____

Student ID: _____

Quiz 8 (A)

Question 1. *(5 marks)* Set up an integral that gives the area enclosed by the curves $y = 1/x$, $y = x$ and $y = \frac{1}{4}x$, with $x > 0$ but don't integrate (hint: sketch a graph).

$\frac{1}{x} = x \Rightarrow 1 = x^2 \Rightarrow x = \pm 1$, $\frac{1}{4}x = x \Rightarrow x = 0$, $\frac{1}{x} = \frac{1}{4}x \Rightarrow 4 = x^2 \Rightarrow x = \pm 2$



$$A = \underbrace{\int_0^1 \left(x - \tfrac{1}{4}x\right) dx}_{R_1} + \underbrace{\int_1^2 \left(\tfrac{1}{x} - \tfrac{1}{4}x\right) dx}_{R_2}$$

Question 2. *(5 marks)* Using the "washer method" set up an integral that gives the volume of the solid generated by rotating the region enclosed by $y = \sqrt{x}$ and $x = 2y$ about the y-axis. Don't integrate this integral.

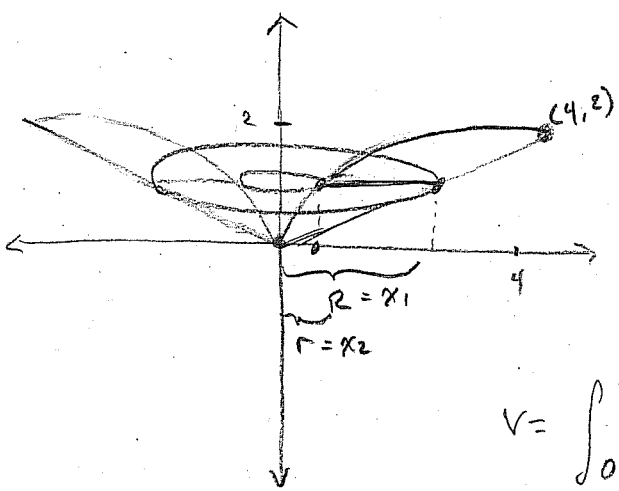
INTERSECTION:

$\sqrt{x} = \frac{1}{2}x$

$x = \frac{1}{4}x^2$

$x^2 - 4x = 0$

$x = 0, 4$



$V = \int_0^2 A(y)\,dy$ $\qquad A(y) = \pi R^2 - \pi r^2$

$R = x_1 = 2y$

$r = x_2 = y^2$

$$\therefore V = \int_0^2 \pi (2y)^2 - \pi (y^2)^2 \, dy$$