

Math 1271 Quiz 11

May, 1, 2014

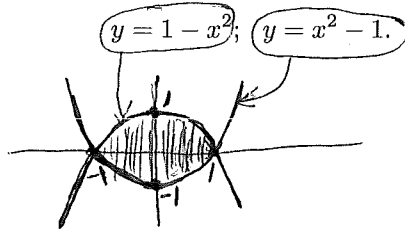
Name: SOLUTIONS

TA: \_\_\_\_\_

NO CALCULATORS. NO HANDHELD DEVICES. NO BOOKS OR REFERENCE MATERIALS OF ANY KIND.

Time allowed: 20 minutes; Grader : Amit Sharma. Good luck!

1. (35 points) Find the area of the region enclosed by the following two curves by writing a definite integral and evaluating it



$$\int_{-1}^1 [(1-x^2) - (x^2-1)] dx = \int_{-1}^1 [2-2x^2] dx$$

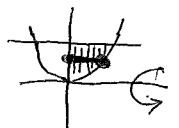
$$= \left[ 2x - 2 \cdot \frac{x^3}{3} \right]_{x \rightarrow -1}^{x \rightarrow 1} = \left[ 2 - \frac{2}{3} \right] - \left[ -2 + \frac{2}{3} \right]$$

$$= 4 - \frac{4}{3} = \frac{12}{3} - \frac{4}{3} = \frac{8}{3}$$

2. (15 points) State whether the following statement is true or false:

If we want use the cylindrical shells method to compute the volume of the solid generated by rotating the area enclosed by the curves  $y = x^2$ ,  $x = 0$  and  $y = 16$  about the  $x$ -axis, then our limits of integration would lie on the  $y$ -axis.

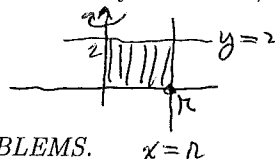
True



3. (15 points) State whether the following statement is true or false:

The volume of the solid generated by rotating the area enclosed by the  $x$ -axis,  $x = 0$ ,  $x = r$  and the line  $y = 2$ , about the  $y$ -axis, is  $\pi r^2$ .

False

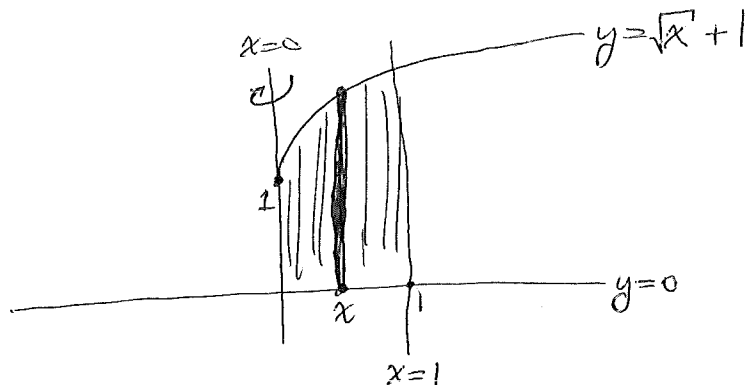


cylinder  
Volume =  $\pi r^2 \cdot 2$

PLEASE SEE THE OTHER SIDE FOR MORE PROBLEMS.

$x=r$

4. (35 points) Find the volume of the solid generated by rotating the area enclosed by the curves  $y = \sqrt{x} + 1$ ,  $y = 0$ ,  $x = 0$  and  $x = 1$ , about the line  $x = 0$ . No need to work out arithmetic.



$$\int_0^1 (\sqrt{x} + 1)(2\pi x) dx$$

$$= 2\pi \int_0^1 (x^{3/2} + x) dx$$

$$= 2\pi \left[ \frac{x^{5/2}}{5/2} + \frac{x^2}{2} \right]_{x=0}^{x=1}$$

$$= 2\pi \left[ \frac{1}{5/2} + \frac{1}{2} \right] = \pi \left[ \frac{4}{5} + 1 \right]$$

$$= \frac{9}{5}\pi$$

PLEASE SEE THE OTHER SIDE FOR MORE PROBLEMS.