Take-Home Quiz 5

Math 132 Section 22

Due Monday, February 27, 2006

Problem 1. (2 points). What is the area of the region above $y = 0$ and below $y = 1 - x^4$?

Problem 2. (2 points). What is the area of the region above $y = x^2$ and below $y = \sqrt{x}$?

Problem 3. (2 points). What is the area of the region bounded on the left by $x = 2y^2 - 4$ and on the right by $x = y^2$?

Problem 4. (2 points). Let R be the region bounded by $y = 0$, $y = x^2 + 1$, $x = -1$, $x = 1$. Rotate the region R around the x-axis, and compute the volume of the resulting solid.

Problem 5. (3 points). Define the following:

$$R_a = \{(x, y) \in \mathbb{R}^2 : 0 \leq y \leq \sqrt{a^2 - x^2}, -a \leq x \leq a\},$$

so R_a is a semicircle of radius a. Rotate R_a around the x-axis, and (using the method of disks) compute the volume of the resulting solid—which is a sphere of radius a. Compare your answer to the formula you know.

Problem 6. (3 points). Let M be a very large number. Consider the region R given by $1 \leq x \leq M$, and $0 \leq y \leq 1/x$. Sketch the region. Rotate R around the x-axis, and compute the volume of the resulting solid in terms of M. What happens if you take the limit as M tends to infinity?