Math 172
4 Mar 2016

Quiz 7
Show Appropriate Work

Name: _____
Point Values in boxes.

1. [6] Find the surface area generated by rotating the graph of $y = \sqrt{9 - x^2}$ for $-1 \le x \le 1$ about the x-axis.

$$y' = \frac{-x}{\sqrt{9-x^2}}$$

$$1 + (y')^2 = 1 + \frac{x^2}{9-x^2}$$

$$= \frac{9}{9-x^2}$$

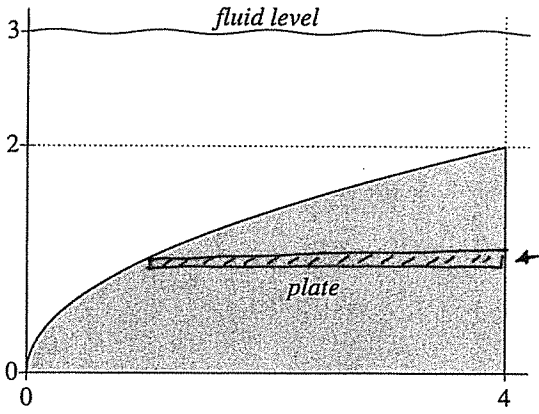
so

$$ds = \frac{3}{\sqrt{9-x^2}}\,dx$$

$$\text{Surface Area} = 2\pi \int_{-1}^{1} \sqrt{9-x^2} \cdot \frac{3}{\sqrt{9-x^2}}\,dx$$

$$= 2\pi(6) = 12\pi$$

2. [4] A vertical plate in the shape of the region bounded by the graph of $y = \sqrt{x}$, $x = 4$, and the x-axis, see the figure below, is submerged in a mystery fluid of density ρ with surface at $y = 3$. Express the fluid force on one side of the plate as an integral. DO NOT EVALUATE THE INTEGRAL.



$y = \sqrt{x}$ so $x = y^2$

$$F_i = \rho \cdot g \cdot (3-y)(4-y^2)\Delta y$$

$$\text{Force} = \rho g \int_0^2 (3-y)(4-y^2)\,dy$$