

## Calculus II - Fall 2013

### Quiz #2, October 17, 2013

In the following problems you are required to show all your work and provide the necessary explanations everywhere to get full credit.

1. Find the volume of a solid obtaining by rotating the region bounded by  $y^2 = x$  and  $x = 2y$  about the  $y$ -axis.

Solution 1: We have

$$V = \int_0^4 2\pi x \left( \sqrt{x} - \frac{x}{2} \right) dx = 2\pi \int_0^4 \left( x^{3/2} - \frac{x^2}{2} \right) dx = 2\pi \left[ \frac{x^{5/2}}{5/2} - \frac{x^3}{6} \right]_0^4 = \frac{64}{15}\pi$$

Solution 2: We have

$$V = \int_0^2 \pi \left( (2y)^2 - (y^2)^2 \right) dy = \pi \int_0^2 (4y^2 - y^4) dy = \frac{64}{15}\pi$$

2. Find the volume of a solid obtaining by rotating the region bounded by  $y = \sqrt{x-1}$ ,  $y = 0$ ,  $x = 5$  about  $y = 3$ .

Solution 1: We have

$$V = \int_0^2 2\pi(3-y)(5-(y^2+1)) dy = 24\pi$$

Solution 2: We have

$$V = \int_1^5 \pi(3^2 - (3 - \sqrt{x-1})^2) dx = 24\pi$$