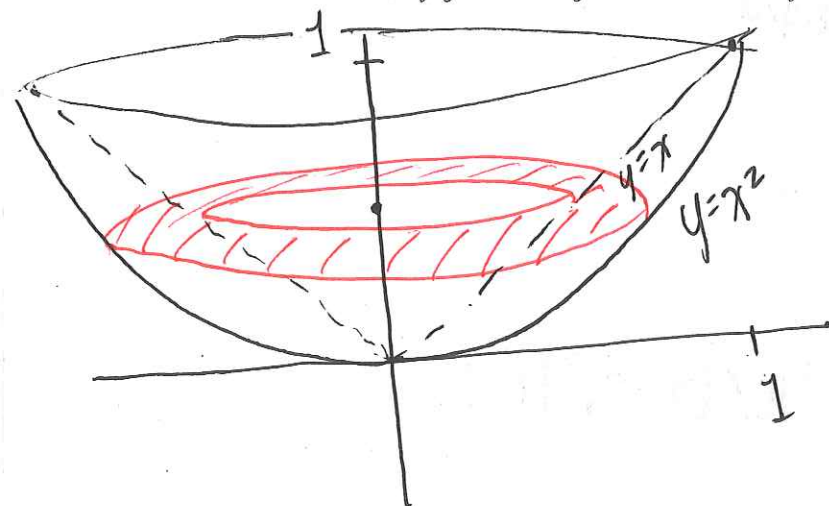# Quiz 3: Volume

February 6, 2013

Name: __Key_____ Section:_____

Instructions: Be sure to write neatly and show all steps. Circle or box your final answer. Answer both questions (second one is on the back).

1. Use the disk or washer method to find the volume of the solid obtained by rotating the region bounded by $y = x$ and $y = x^2$ about the y-axis.

* Integrate with respect to y
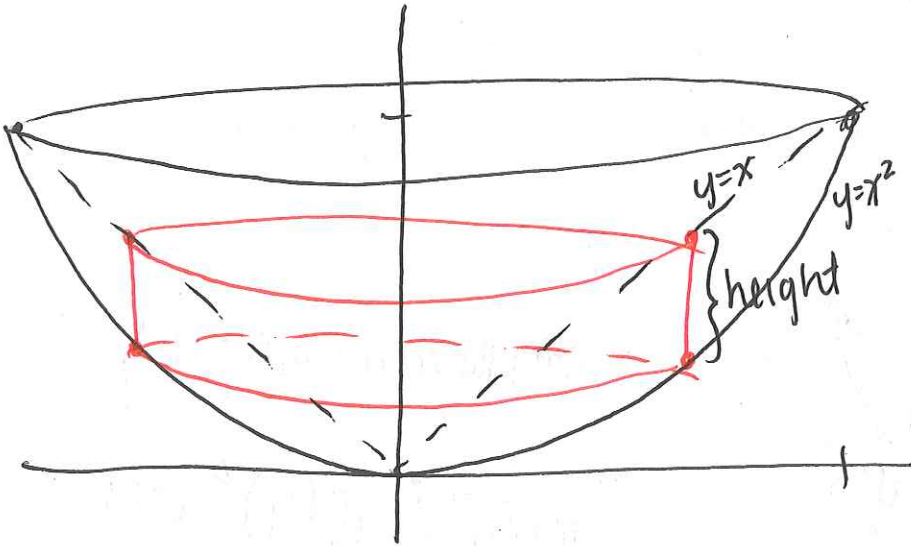
$$\int_0^1 \pi(\sqrt{y})^2 - \pi(y)^2 \, dy$$

$$= \int_0^1 \pi(y - y^2) \, dy$$

$$= \pi\left(\frac{y^2}{2} - \frac{y^3}{3}\right)\Big|_0^1$$

$$= \pi\left(\frac{1}{2} - \frac{1}{3}\right) = \boxed{\frac{\pi}{6}}$$

2. Use the cylindrical shells method to find the volume of the solid obtained by rotating the region bounded by $y = x$ and $y = x^2$ about the y-axis.

integrate w/ respect to x

$radius = x$

$height = x - x^2$

$$Vol = \int_0^1 2\pi x(x - x^2)\,dx$$

$$= 2\pi \int_0^1 x^2 - x^3 = 2\pi\left(\frac{x^3}{3} - \frac{x^4}{4}\right)\Big|_0^1$$

$$= 2\pi\left(\frac{1}{3} - \frac{1}{4}\right)$$

$$= 2\pi\left(\frac{1}{12}\right) = \boxed{\frac{\pi}{6}}$$

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Note the answer is the same as #1.