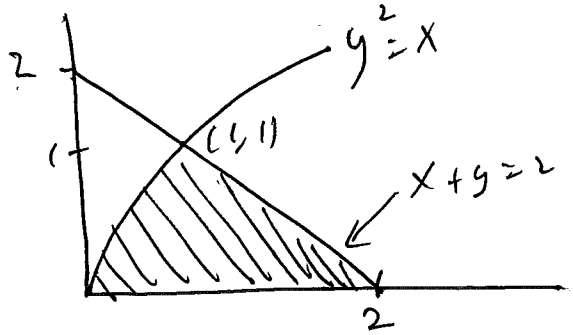
Math 120 Spring 2014 **BONUS Quiz THREE**

SHOW ALL YOUR WORK!

Consider the region A bounded above by the curve $y^2 = x$ and the line $x + y = 2$ and below by the x-axis.

(a) (*2 points*) Give a sketch of A and find its area.



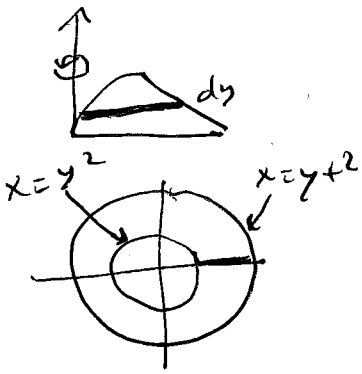
(b) (*4 points*) Find the volume of the solid of revolution formed by rotating A about the y-axis.

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

$$= \pi \frac{(y-2)^3}{3}\Big|_0^1 - \pi \frac{y^5}{5}\Big|_0^1$$

$$= \pi \left[-\frac{1}{3} - \left(-\frac{8}{3}\right) \right] - \pi \frac{1}{5}$$

$$= \pi \left(\frac{7}{3} - \frac{1}{5} \right) = \left(\frac{35-3}{15} \right) \pi = \frac{32\pi}{15}$$



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(c) (*4 points*) Find the volume of the solid of revolution formed by rotating A about the x-axis.

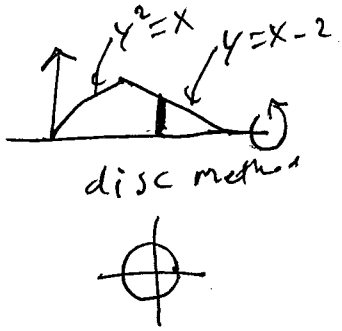
$$V = \pi \int_0^2 y^2 \, dx$$

$$= \pi \int_0^1 y^2 \, dx + \pi \int_1^2 y^2 \, dx$$

$$= \pi \int_0^1 x \, dx + \pi \int_1^2 (x-2)^2 \, dx$$

$$= \pi \cdot \frac{1}{2} + \pi \frac{(x-2)^3}{3}\Big|_1^2$$

$$= \frac{\pi}{2} + \pi \left(0 - \left(-\frac{1}{3}\right) \right) = \frac{\pi}{2} + \frac{\pi}{3} = \frac{5\pi}{6}$$



disc method