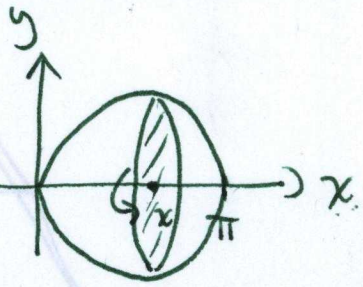
Math 182-Quiz 1 NAME: Key

Instructions: *Show at least one step of your work (where appropriate) for full credit.*

1. Compute the volume of the solid obtained by rotating the region bounded by $y = \sin x$ and $y = 0$ on the interval $0 \leq x \leq \pi$ about the x-axis.

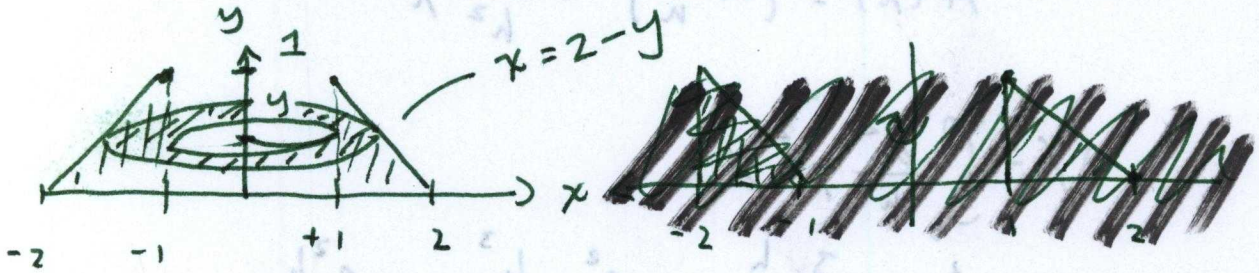


$A(x) = \pi(\sin x)^2$

$$V = \int_0^{\pi} \pi(\sin x)^2 dx$$

oops! can't compute.

2. Compute the volume of the solid obtained by rotating the region bounded by $y = -x+2$ and $y = 0$ on the interval $1 \leq x \leq 2$ about the y-axis.



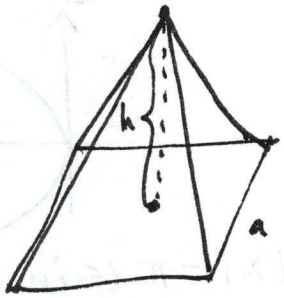
$A(y) = \pi(2-y)^2 - \pi(1)^2 = \pi(4-4y+y^2-1)$

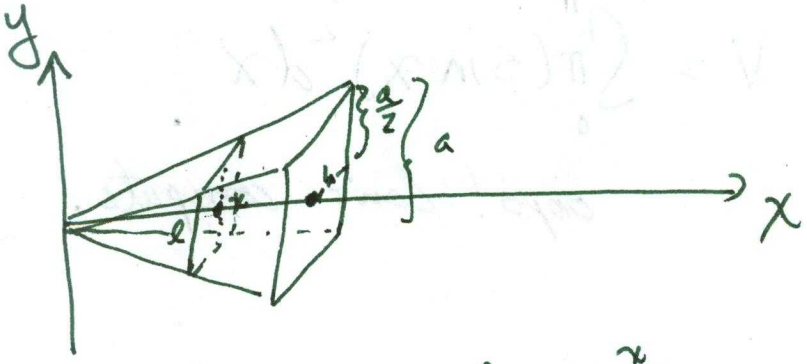
$$V = \int_0^1 \pi(3-4y+y^2)\,dy$$

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

Extra Credit: Using methods from 6.2, compute the volume of the following solid.

a pyramid with height h and square base of length a.





$$\frac{h}{x} = \frac{a}{l} \quad : l = a\frac{x}{h}$$

$$A(x) = \left(a\frac{x}{h}\right)^2 = \frac{a^2}{h^2}x^2$$

$$V = \int_0^h \frac{a^2}{h^2}x^2\,dx$$

$$= \frac{a^2}{h^2}\cdot\frac{x^3}{3}\Big|_0^h = \frac{a^2}{h^2}\cdot\frac{h^3}{3} = \frac{a^2h}{3}.$$