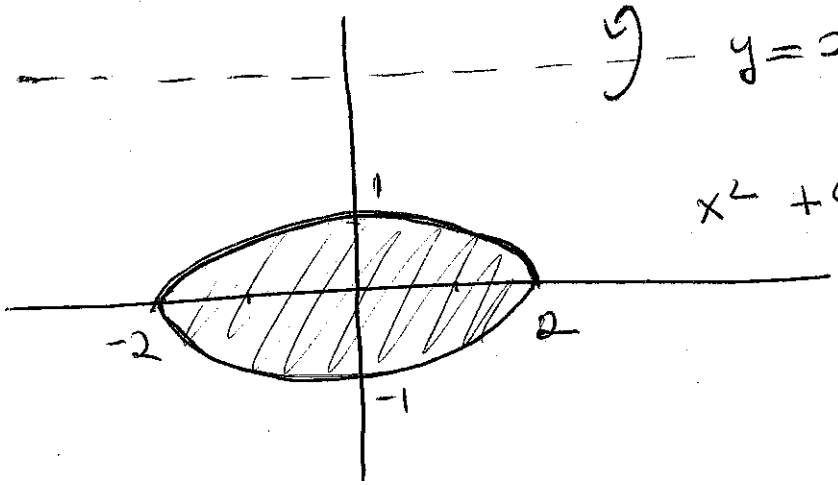
Name: May-09-14

Id:

Quiz#3

Math1B

1) Set up an integral for the volume of the solid obtained by rotating the region bounded by the curve $x^2 + 4y^2 = 4$ about y=2



$x^2 + 4y^2 = 4$

$x^2 + 4y^2 = 4 \Rightarrow 4y^2 = 4 - x^2$

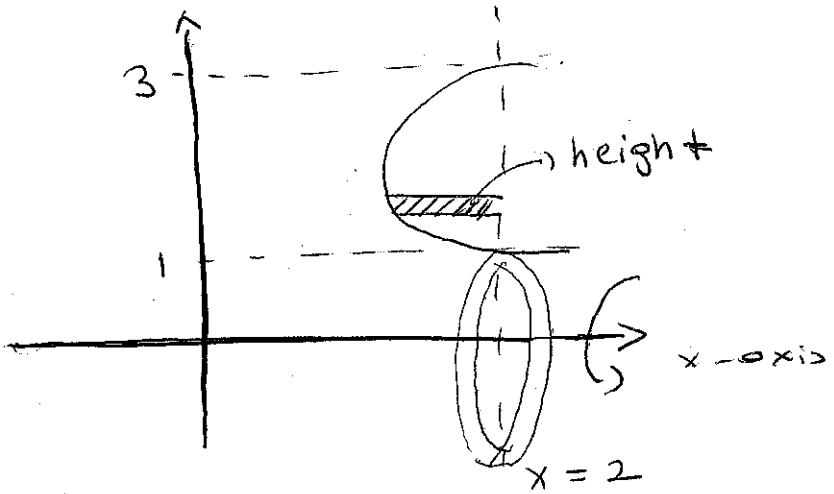
$\Rightarrow y^2 = 1 - \frac{x^2}{4} \Rightarrow y = \mp\sqrt{1 - \frac{x^2}{4}}$

$$V = \int_{-2}^{2} \pi \left[\left(2 - \left(-\sqrt{1 - x^2/4}\right)\right)^2 - \left(2 - \sqrt{1 - x^2/4}\right)^2 \right] dx$$

(even Function)

$$= 2\pi \int_{0}^{2} 8\sqrt{1 - x^2/4}\, dx = 78.95684$$

2) Use the method of cylindrical shells to find the volume of the solid obtained by rotating the region bounded by the curve $x = 1 + (y-2)^2$ ~~about~~ x=2 around x-axis



Intersection points

$1 + (y-2)^2 = 2$

$y^2 - 4y + 4 + 1 - 2 = 0$

$y^2 - 4y + 3 = 0$

$(y-3)(y-1) = 0$

$y = 3 \quad y = 1$

The height of the shell is:

$2 - [1 + (y-2)^2] = 1 - (y-2)^2$

$= 1 - (y^2 - 4y + 4)$

$= -y^2 + 4y - 3$

$$V = 2\pi \int_1^3 y(-y^2 + 4y - 3)\,dy$$

$$= 2\pi \int_1^3 (-y^3 + 4y^2 - 3y)\,dy$$

$$= 2\pi \left[-\frac{1}{4}y^4 + \frac{4}{3}y^3 - \frac{3}{2}y^2 \right]_1^3$$

$$= 2\pi \left(\frac{8}{3} \right) = \frac{16\pi}{3}$$