

Math 1172 Homework #2

Section 5.1 #18

Section 5.2 #13, 25

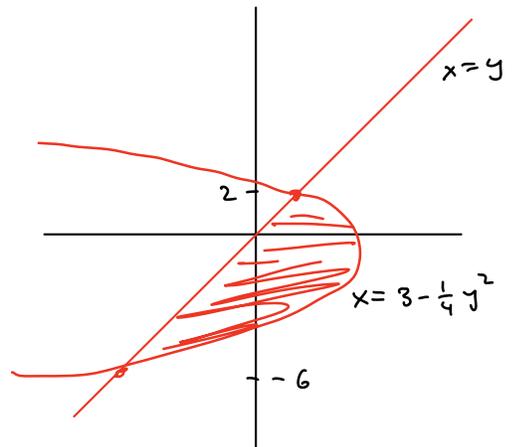
Section 5.3 25

5.1 #18

A. between  $4x + y^2 = 12$  &  $x = y$

$$4x = 12 - y^2$$

$$x = 3 - \frac{1}{4}y^2$$



Intersections:

$$4y + y^2 = 12$$

$$y^2 + 4y - 12 = 0$$

$$(y+6)(y-2) = 0$$

$$y = 2, y = -6$$

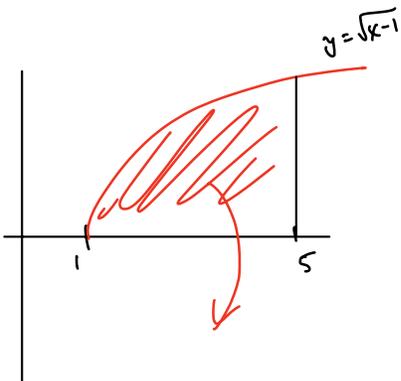
$$\int_{-6}^2 \left( 3 - \frac{1}{4}y^2 - y \right) dy = \left. 3y - \frac{1}{12}y^3 - \frac{1}{2}y^2 \right|_{-6}^2$$

$$= 3 \cdot 2 - \frac{1}{12} \cdot 2^3 - \frac{1}{2} \cdot 2^2 - \left( 3(-6) - \frac{1}{12}(-6)^3 - \frac{1}{2}(-6)^2 \right)$$

5.2 #13

$y = \sqrt{x-1}$ ,  $y=0$ ,  $x=5$

Rot. around x-axis



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

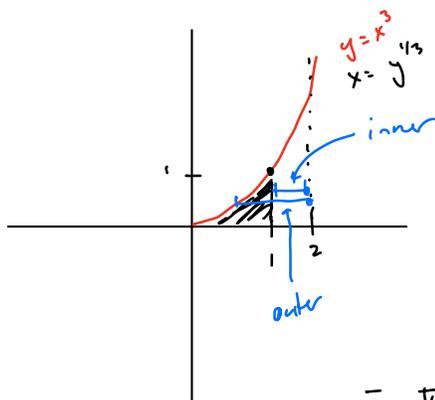
$$= \pi \left( \frac{1}{2}x^2 - x \right) \Big|_1^5$$

$$= \pi \left( \frac{1}{2} \cdot 5^2 - 5 \right) - \pi \left( \frac{1}{2} \cdot 1^2 - 1 \right)$$

5.2 #25

$y = x^3, y=0, x=1$  about  $x=2$

Rot axis is vertical, so the integral must be  $dy$



$x = y^{1/3}$

$$\pi \int_0^1 (2 - y^{1/3})^2 - (1)^2 dy$$

$$= \pi \int_0^1 4 - 4y^{1/3} + y^{2/3} - 1 dy$$

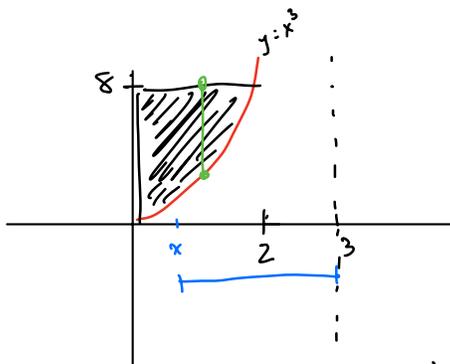
$$= \pi \int_0^1 3 - 4y^{1/3} + y^{2/3} dy$$

$$= \pi \left( 3y - 4 \cdot \frac{3}{4} y^{4/3} + \frac{3}{5} y^{5/3} \right) \Big|_0^1$$

$$= \pi \left( 3 - 4 \cdot \frac{3}{4} + \frac{3}{5} \right) = \frac{3}{5} \pi$$

5.3 #25

$y = x^3, y=8, x=0$  , about  $x=3$



height =  $8 - x^3$

dist to axis =  $3 - x$

$$V = 2\pi \int_0^2 (3-x)(8-x^3) dx$$

$$= 2\pi \int_0^2 24 - 8x - 3x^3 + x^4 dx$$

$$= 2\pi \left( 24x - 4x^2 - \frac{3}{4}x^4 + \frac{1}{5}x^5 \right) \Big|_0^2$$

$$= 2\pi \left( 24 \cdot 2 - 4 \cdot 2^2 - \frac{3}{4} \cdot 2^4 + \frac{1}{5} \cdot 2^5 \right) = \dots 0$$