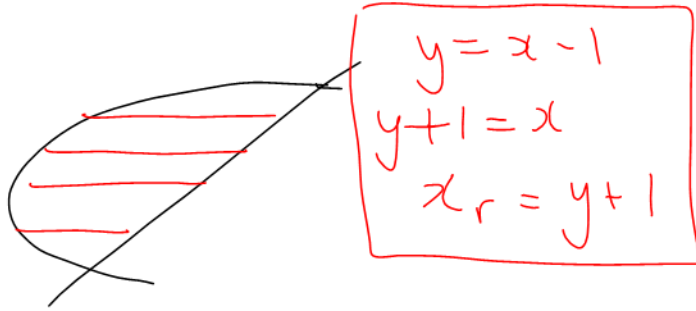


Review Problems on website.

18



$$y^2 = 2x + 6$$
$$y^2 - 6 = 2x$$
$$\frac{y^2}{2} - 3 = x$$
$$x_l = \frac{y^2}{2} - 3$$

Intersection

$$y = y \quad x = x$$

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

$$y^2 - 6 = 2y + 2$$

$$y^2 - 2y - 8 = 0$$

$$(y - 4)(y + 2) = 0$$

$$y = 4, -2$$

d

$$A = \int_c^d (x_r - x_l) dy$$

$$= \int_{-2}^4 [y + 1 - (\frac{y^2}{2} - 3)] dy$$

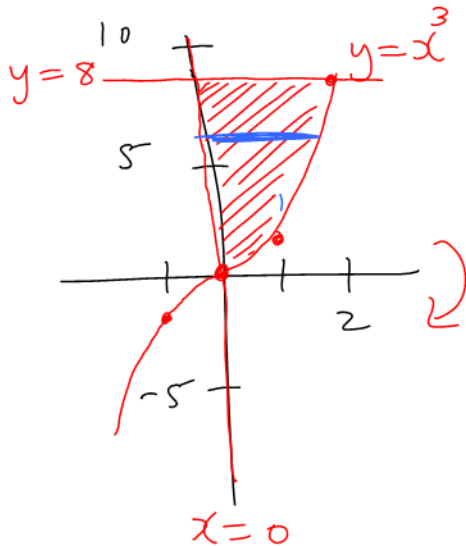
$$= \int_{-2}^4 (y + 1 - \frac{y^2}{2} + 3 + 4) dy$$

$$= \left[ \frac{y^2}{2} - \frac{y^3}{6} + 4y \right]_{-2}$$

$$= \left[ \frac{4^2}{2} - \frac{4^3}{6} + 16 \right] - \left[ \frac{4}{2} + \frac{8}{6} - 8 \right]$$

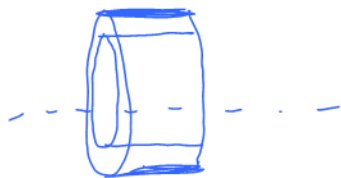
$$= 18$$

(19)



$x$	$y = x^3$
-1	-1
0	0
1	1
2	8

Must use Shell Method  
(region is not touching  $x$ -axis).



$$\begin{aligned} \text{Shell} \\ dV &= 2\pi r h t \\ &= 2\pi y x dy \end{aligned}$$

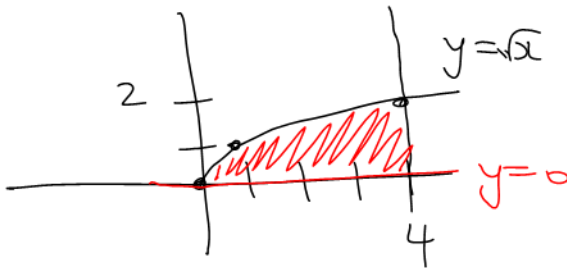
$$\begin{aligned} V &= \int_0^8 2\pi y x dy \\ &= 2\pi \int_0^8 y x dy \end{aligned}$$

$$\begin{aligned} y &= x^3 \\ y^{1/3} &= x \end{aligned}$$

$$= 2\pi \int_0^8 y y^{1/3} dy$$

$$\begin{aligned}
 &= 2\pi \int_0^8 y^{4/3} dy \\
 &= 2\pi \left[ \frac{3}{7} y^{7/3} \right]_0^8 \\
 &= 2\pi \left[ \frac{3}{7} (128) - 0 \right] \\
 &= \frac{768\pi}{7}
 \end{aligned}$$

(20)



$x$	$y = \sqrt{x}$
0	0
1	1
4	2

$$\begin{aligned}
 A &= \int_a^b (y_t - y_b) dx \\
 &= \int_0^4 \boxed{\sqrt{x} dx} \quad dA \\
 &= \left[ \frac{2}{3} x^{3/2} \right]_0^4 \\
 &= \frac{2}{3} \left[ x^{3/2} \right]_0^4 \\
 &= \frac{2}{3} (8 - 0) \\
 &= \frac{16}{3}
 \end{aligned}$$

Vertical Slices



$x_e = x$ -Coordinate of Centre of slice  
 $= x$

$y_e = y$ -Coordinate of Centre of slice

$$= \frac{y_t + y_b}{2}$$

$$= \frac{\sqrt{x} + 0}{2}$$

$$= \frac{\sqrt{x}}{2}$$

$$\bar{x} = \frac{1}{A} \int_A x_e dA$$

$$= \frac{3}{16} \int_0^4 x \sqrt{x} dx$$

$$= \frac{3}{16} \int_0^4 x^{3/2} dx$$

$$= \frac{3}{16} \left[ \frac{2}{5} x^{5/2} \right]_0^4$$

$$= \frac{3}{16} \left[ \frac{2}{5} (4^{5/2}) - 0 \right]$$

$$= \frac{12}{5} \text{ or } 2.4$$

$$\bar{y} = \frac{1}{A} \int_A y_e dA$$

$$= \frac{3}{16} \int_0^4 \frac{\sqrt{x}}{2} \sqrt{x} dx$$

$$= \frac{3}{32} \int_0^4 x dx$$

$$= \frac{3}{32} \left[ \frac{x^2}{2} \right]_0^4$$

$$= \frac{3}{32} [8 - 0]$$

$$= \frac{24}{32} \text{ or } \frac{3}{4} \text{ or } 0.75$$