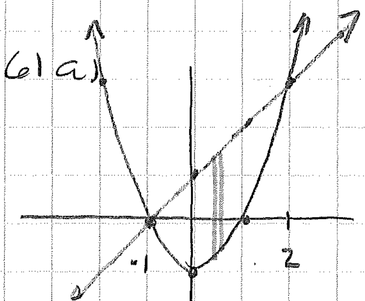
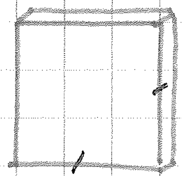
7-#2 · p. 465: 61ab, 62abcd, 63ab and handout

61a)





$2+x-x^2$

side length:

$(x+1)-(x^2-1)$

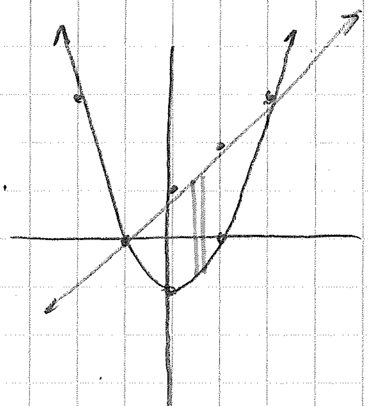
$x+1-x^2+1$

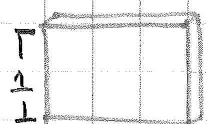
$2+x-x^2$

Area $= (2+x-x^2)^2$

Volume $= \int_{-1}^{2}(2+x-x^2)^2\,dx = 8\frac{1}{10}$

b.



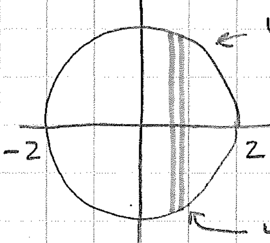


$2+x-x^2$

Area $= (2+x-x^2)(1)$

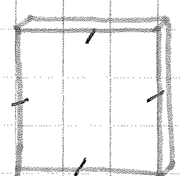
Volume $= \int_{-1}^{2}(2+x-x^2)\,dx = 9/2$

62a)



$\leftarrow y=\sqrt{4-x^2}$

$y=-\sqrt{4-x^2}$



$2\sqrt{4-x^2}$

side length =

$\sqrt{4-x^2}-(-\sqrt{4-x^2})$

$2\sqrt{4-x^2}$

area $= (2\sqrt{4-x^2})^2 = 4(4-x^2)$

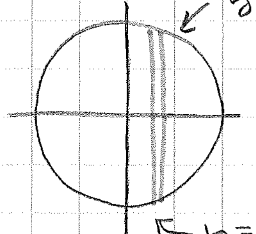
Volume $= \int_{-2}^{2} 4(4-x^2)\,dx$

$= 4\int_{-2}^{2}(4-x^2)\,dx$

$= 8\int_{0}^{2} 4-x^2\,dx$

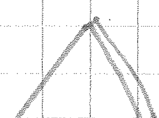
$= 8\left[4x-\frac{1}{3}x^3\right]_0^2 = 8\left[8-\frac{8}{3}\right] = \boxed{\frac{128}{3}}$

b)



$y=\sqrt{4-x^2}$

$y=-\sqrt{4-x^2}$



$2\sqrt{4-x^2}$

side length: $2\sqrt{4-x^2}$

area $= \frac{\sqrt{3}}{4}\left(2\sqrt{4-x^2}\right)^2$

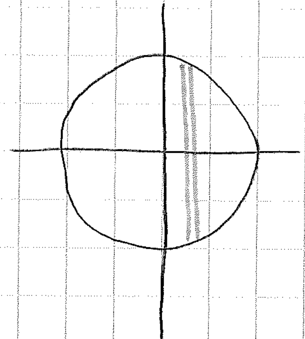
$= \frac{\sqrt{3}}{4}\cdot 4(4-x^2)$

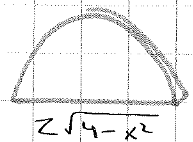
$= \sqrt{3}(4-x^2)$

Volume $= \int_{-2}^{2}\sqrt{3}(4-x^2)\,dx$

$\sqrt{3}\int_{-2}^{2}(4-x^2)\,dx = \boxed{\frac{32\sqrt{3}}{3}}$

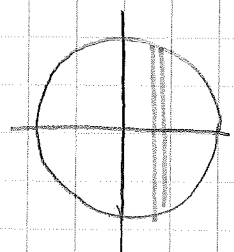
62 c)

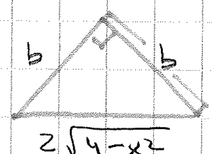




$$\text{diameter} = 2\sqrt{4-x^2}$$
$$\text{radius} = \sqrt{4-x^2}$$
$$\text{area} = \frac{1}{2}\pi r^2$$
$$= \pi/2\left(\sqrt{4-x^2}\right)^2$$
$$= \pi/2\,(4-x^2)$$
$$\text{Volume} = \int_{-2}^{2} \pi/2\,(4-x^2)\,dx$$
$$\pi/2 \int_{-2}^{2} (4-x^2)\,dx = \boxed{\frac{16\pi}{3}}$$

62. d.

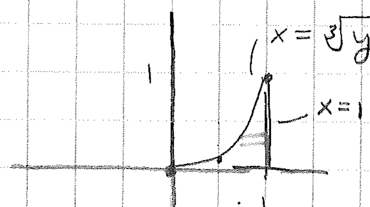


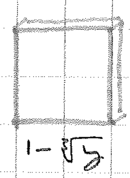


$$\text{side} = 2\sqrt{4-x^2}$$
$$b = \frac{2\sqrt{4-x^2}}{\sqrt{2}} \leftarrow 45^\circ\text{-}45^\circ\text{-}90^\circ$$
$$\text{area} = \frac{1}{2}\left(\frac{2\sqrt{4-x^2}}{\sqrt{2}}\right)\left(\frac{2\sqrt{4-x^2}}{\sqrt{2}}\right)$$
$$= \frac{1}{2}\cdot\frac{4(4-x^2)}{2} = 4-x^2$$

$$\text{Volume} = \int_{-2}^{2} 4-x^2\,dx = \boxed{\frac{32}{3}}$$

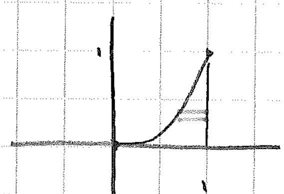
63a.

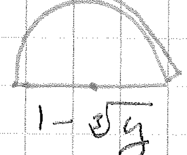




$$\text{side} = 1-\sqrt[3]{y}$$
$$\text{area} = (1-\sqrt[3]{y})^2$$
$$V = \int_0^1 (1-\sqrt[3]{y})^2\,dy$$
$$= \int_0^1 1-2y^{1/3}+y^{2/3}\,dy$$
$$\left[y-\tfrac{3}{2}y^{4/3}+\tfrac{3}{5}y^{5/3}\right]_0^1$$
$$1-3/2+3/5 = \boxed{1/10}$$

b.





$$\text{diameter} = 1-\sqrt[3]{y}$$
$$r = \frac{1-\sqrt[3]{y}}{2}$$
$$\text{area} = \frac{1}{2}\pi\left(\frac{1-\sqrt[3]{y}}{2}\right)^2$$
$$= \pi/8\,(1-\sqrt[3]{y})^2$$
$$V = \pi/8\int_0^1 (1-\sqrt[3]{y})^2\,dy$$
$$\pi/8\,(1/10) = \pi/80$$