HW ch.6

6.2 (extra)

(31)(a) $y = e^{-x^2}$, $y = 0$, $x = -1$, $x = 1$

$\frac{1}{e^{x^2}}$

$x = -1$ Δx $x = 1$
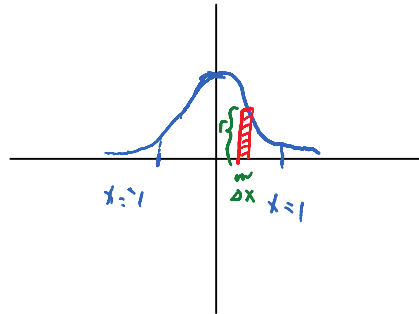
$V_i = \pi r^{2} h$

$V_i = \pi \left(e^{-x_i^2}\right)^2 \Delta x$

$= \pi e^{-2x_i^2} \Delta x$

$V = \pi \int_{-1}^{1} e^{-2x^2} dx$ ✓
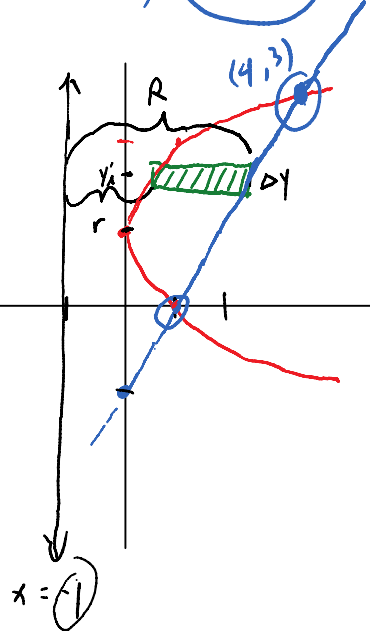
(§) 6.3 #43

$x = (y-1)^2$, $\boxed{x - y = 1}$; $\boxed{x = -1}$

$\boxed{x = y+1}$

$R = y_i + 1 - (-1)$

$\boxed{= y_i + 2}$

$r = (y_i - 1)^2 - (-1)$

$\boxed{= (y_i - 1)^2 + 1}$

$(4, 3)$

$x = -1$

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

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

$0 = y^2 - 3y$

$0 = y(y-3)$

$y = 0 \quad y = 3$

$V_i = \pi R^2 (h) - \pi r^2 h$

$y^2 - 2y + 1 + 1$

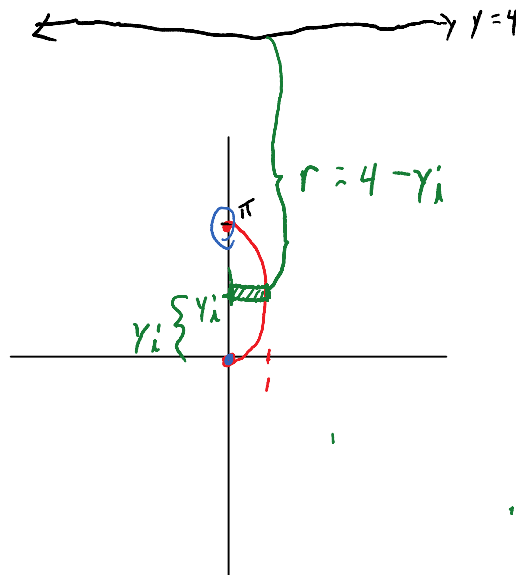$$= \pi \left(y_i + 2 \right)^2 \Delta y - \pi \left((y_i - 1)^2 + 1 \right)^2 \Delta y$$

$$V = \pi \int_0^3 \left[(y+2)^2 - (y^2 - 2y + 2)^2 \right] dy$$

$$\vdots$$

6.3

(25)

$$x = \sqrt{\sin y}, \qquad 0 \le y \le \pi, \quad x = 0 \; ; \; about \; y = 4$$

$r = 4 - y_i$

x	y
0	0
	$\frac{\pi}{2}$
0	π

$$V_i = 2\pi \left(4 - y_i \right) \sqrt{\sin y_i} \; \Delta y$$

$2\pi (4 - y_i)$

$\sqrt{\sin y_i}$
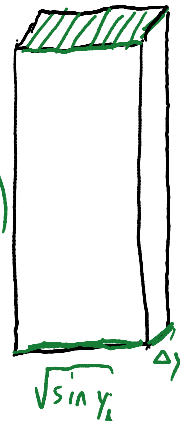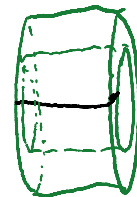
Δy

$$V = 2\pi \int_0^\pi (4 - y) \sqrt{\sin y} \; dy$$

6.4

(27) (2)   use $9.8 \; m/sec^2$

$$W = 5880 \text{ J}$$

(22)

$$W = F \cdot D$$

$$W_i = F_i \cdot D_i$$

$$x^2 + y^2 = 9$$

$$x = \sqrt{9 - y^2}$$
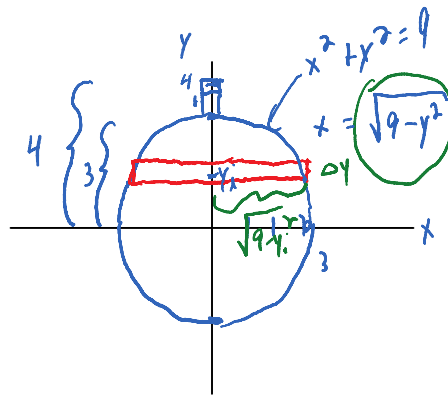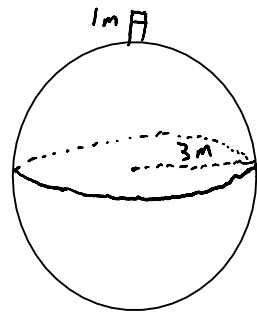
$$F_i = \left(1000 \frac{kg}{m^3} \cdot 9.8 \frac{m}{sec^2} = 9800 \right) \left[\frac{kg \cdot \frac{m}{sec^2}}{m^3} = \frac{N}{m^3} \right] \left(\text{Volume of ith slice} \right)$$

$$F_i = \left(\begin{array}{c} \text{weight} \\ \text{density} \end{array} \right) \left(\text{volume} \right) = 9800 \cdot \left(\pi \left(\sqrt{9 - y_i^2} \right)^2 \right) \Delta y$$

$$D_i = (4 - y_i)$$

$$W_i = F_i \cdot D_i = \underbrace{9800 \, \pi (9 - y_i^2) \Delta y}_{F_i} \underbrace{(4 - y_i)}_{D_i}$$

$$W = 9800\pi \int_{-3}^{3} (9 - y^2)(4 - y) \, dy$$