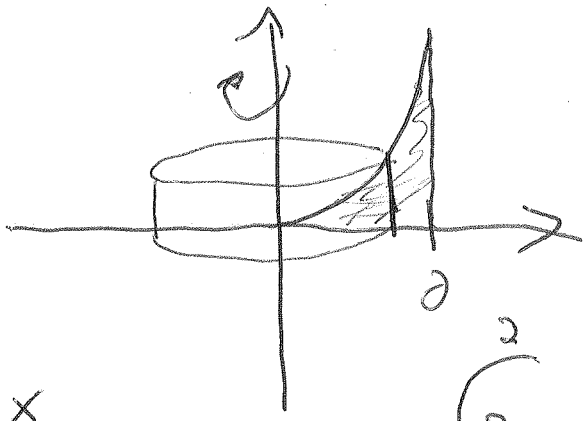
Calculus Section 7.3

#33

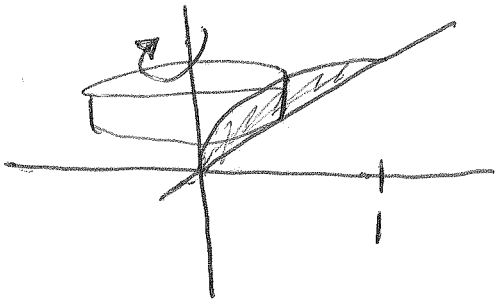


Shell $r = x$, $h = x^2$

$$V = \int_0^2 2\pi x(x^2)\,dx$$

$$2\pi \int_0^2 x^3\,dx = \boxed{8\pi}$$

#34



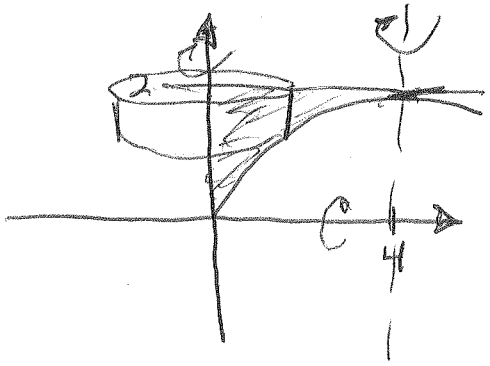
Shells

$r = x$

$h = \sqrt{x} - x$

$$V = \int_0^1 2\pi x(\sqrt{x} - x)\,dx = \boxed{\frac{2\pi}{15}}$$

#35



a) the x-axis Washer $R = 2$ $r = \sqrt{x}$

$$V = \int_0^4 \pi\left(2^2 - (\sqrt{x})^2\right)dx \quad = V = \pi\int_0^4 4 - x\,dx$$

$$= \boxed{8\pi}$$

b) y-axis Shells

$$r = x \quad h = 2 - \sqrt{x} \quad V = 2\pi\int_0^4 x(2-\sqrt{x})dx$$

$$\boxed{\frac{32}{5}\pi}$$

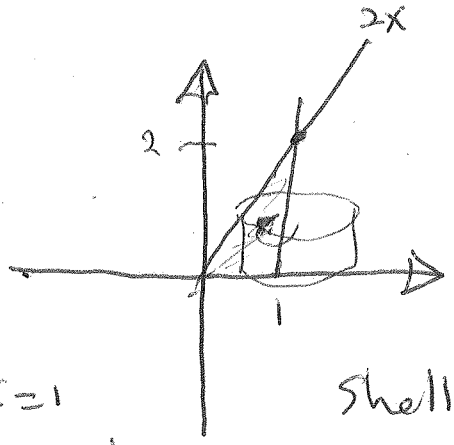
c) around $y = 2$ Disk

$$V = \pi\int_0^4 (2-\sqrt{x})^2 dx \quad = \boxed{\frac{8\pi}{3}}$$

d) around $x = 4$ Shell $r = 4 - x$ $h = 2 - \sqrt{x}$

$$V = 2\pi\int_0^4 (4-x)(2-\sqrt{x})dx = \boxed{\frac{224\pi}{15}}$$

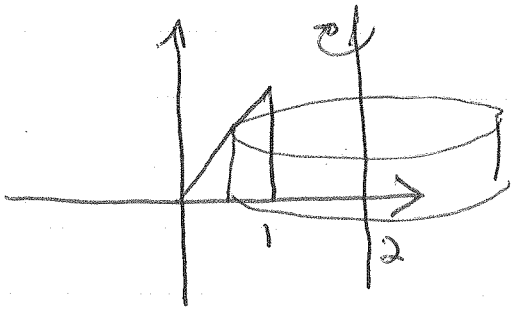
#36



a) line $x=1$ shell $r = 1-x$, $h = 2x$

$$V = 2\pi \int_0^1 (1-x)(2x)\,dx = \boxed{\frac{2\pi}{3}}$$

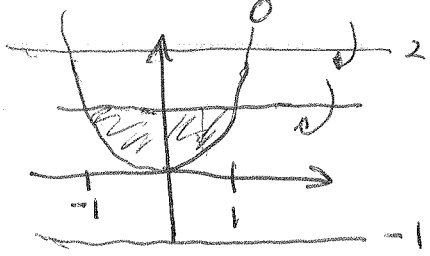
b) Line $x=2$



shell
$r = 2-x$
$h = 2x$

$$V = 2\pi \int_0^1 (2-x)2x\,dx = \boxed{\frac{8}{3}\pi}$$

#37



a) Disk $\pi \int_{-1}^{1} (1-x^2)^2\,dx$

$$= \boxed{\frac{16}{15}\pi}$$

b) $y=2$ Washer $R = 2-x^2$, $r = 1$

$$V = \pi \int_{-1}^{1} \left((2-x^2)^2 - 1^2\right) dx$$

$$= \boxed{\frac{56\pi}{15}}$$

c) $y=-1$ washer $R = 2$, $r = x^2+1$

$$V = \pi \int_{-1}^{1} 2^2 - (x^2+1)^2\,dx \quad \boxed{\frac{64}{15}\pi}$$