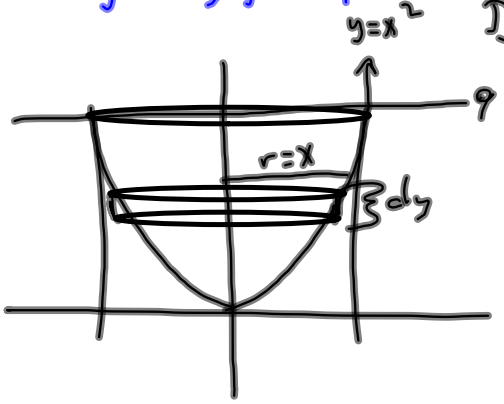
Bdd by $x=0$, $y=9$ & $y=x^2$



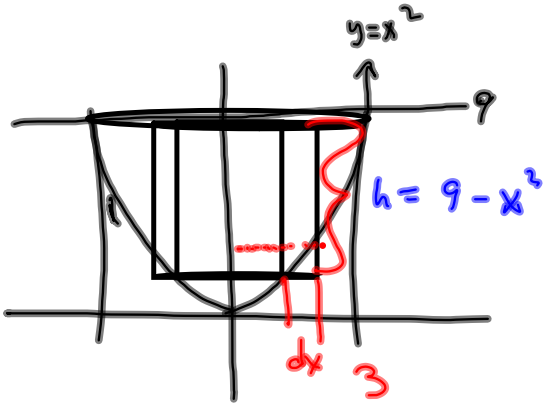
Disk:

$$\pi\int_0^9 (\sqrt{y})^2\,dy$$

$y=x^2$

$x=\pm\sqrt{y}$ take the positive one.

$$\pi\int f(x)^2\,dx \text{ or } \pi\int f(y)^2\,dy$$



Shell:

~~$2\pi\int_0^3 (9-x^2)\,dx$~~ Dumb

$$2\pi\int x f(x)\,dx \text{ or } 2\pi\int y f(y)\,dy$$

$$= 2\pi\int_0^3 x(9-x^2)\,dx$$

$$\text{Pi}\cdot\int_0^9 y\,dy$$

$$\frac{81}{2}\pi$$

$$2\cdot\text{Pi}\cdot\int_0^3 x\cdot(9-x^2)\,dx$$

$$\frac{81}{2}\pi$$

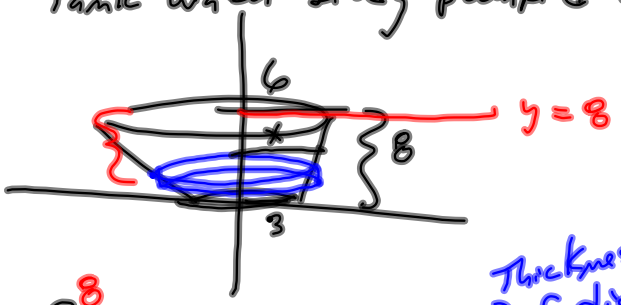
§5.4 #23

§5.3 #8

§5.1 #31

#23 §5.4

Tank water being pumped out



$$W = 62.5\int_0^8 \pi\left(\frac{3}{8}y+3\right)^2 (8-y)\,dy$$

Radius of rep. disk

Height a rep. disk is life

Thickness of disk

$m = \frac{8}{3}$

$y = \frac{8}{3}(x-3)+0$

$y = \frac{8}{3}x - 8$

$\frac{8}{3}x = y + 8$

$x = \frac{3}{8}(y+8)$

$x = \frac{3}{8}y + 3$

5.4 #23

$$62.5\cdot\int_0^8 \mathrm{Pi}\cdot(8-y)\cdot\left(\frac{3}{8}\cdot y+3\right)^2 dy$$

$$33000.0\,\pi$$

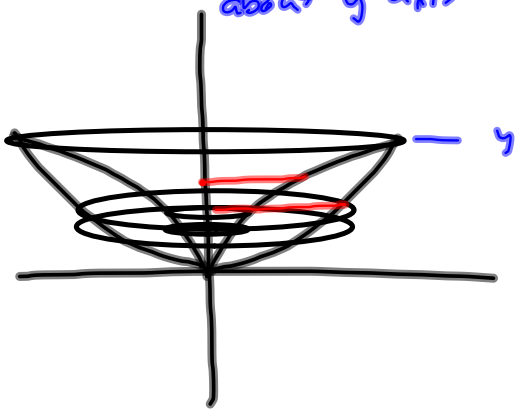
evalf(%)

$$1.036725576\ 10^5$$

Ss.3 # 8

$y = x^2, y = \sqrt{x}$ washer

about y-axis



$$\pi \int_0^1 \left((\sqrt{y})^2 - (y^2)^2 \right) dy$$

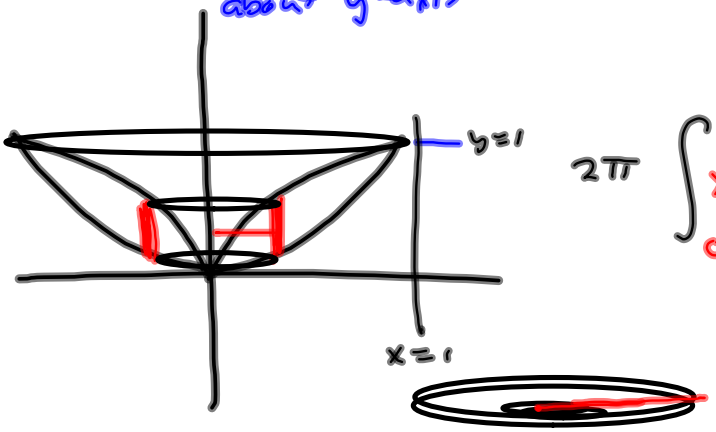
$$\text{Pi} \cdot \int_0^1 \left(y - y^4 \right) dy$$

$$\frac{3}{10}\pi$$

$$2 \cdot \text{Pi} \cdot \int_0^1 x \cdot \left(\sqrt{x} - x^2 \right) dx$$

$$\frac{3}{10}\pi$$

about y-axis



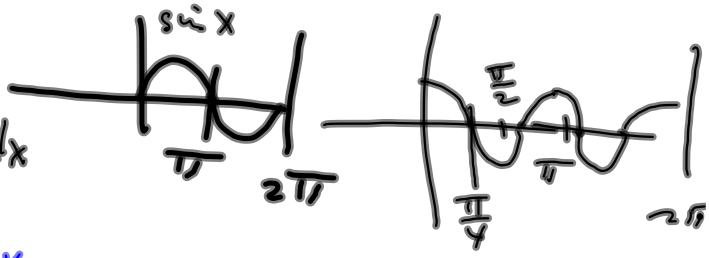
$$2\pi \int_0^1 x\left(\sqrt{x} - x^2\right) dx$$

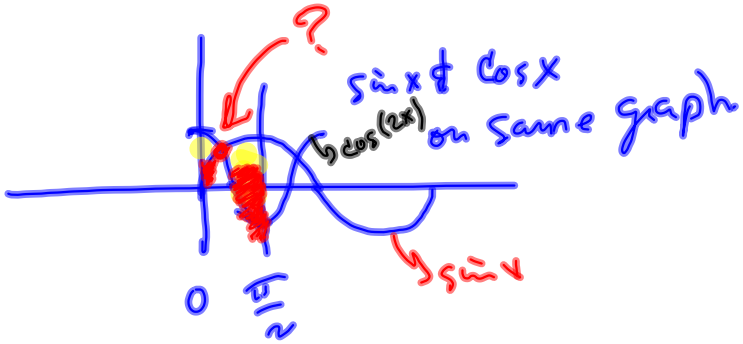
Evaluate & interpret as an area.
Sketch the region.

§5.1 #31

$$\int_0^{\frac{\pi}{2}} |\sin x - \cos(2x)|\,dx$$

$\cos(2x) = 1 - 2\sin^2 x$





$\cos(2x) = \sin x$

$\cos(2x) - \sin x = 0$

$1 - 2\sin^2 x - \sin x = 0$

$-2\sin^2 x - \sin x + 1 = 0$

$2\sin^2 x + \sin x - 1 = 0$

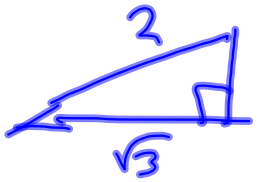
$2u^2 + u - 1 = 0$

$(2u-1)(u+1) = 0$

$u = \frac{1}{2}$ or $u = -1$

$\sin x = \frac{1}{2}$ $\quad \sin x = -1$

$x = \frac{\pi}{6}$ $\left(\frac{5\pi}{6}, \ldots\right)$ $\quad x = \frac{3\pi}{2}, \ldots$



$$\int_0^{\frac{\pi}{6}} (\cos(2x) - \sin x)\,dx$$

$$+ \int_{\frac{\pi}{6}}^{\frac{\pi}{2}} (\sin x - \cos(2x))\,dx$$