

6.1

$$19. \quad f(x) = x^2 + 2x + 1 ; g(x) = 3x + 3$$

$$x^2 - x - 2 = 0$$

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

$$x = 2 \text{ \& } -1$$

$$\int_{-1}^2 (3x + 3 - (x^2 + 2x + 1)) dx$$

$$= \int_{-1}^2 (-x^2 + x + 2) dx = \left. -\frac{1}{3}x^3 + \frac{1}{2}x^2 + 2x \right|_{-1}^2 = \dots$$

43.

$$f(x) = \cos x ; g(x) = 2 - \cos x , 0 \leq x \leq 2\pi$$

$$\cos x = 2 - \cos x$$

$$2 \cos x = 2$$

$$\cos x = 1$$

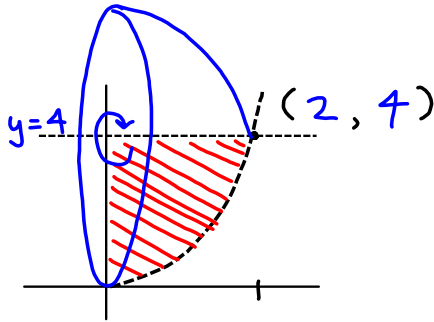
$$x = 0, 2\pi$$

$$\int_0^{2\pi} (2 - 2 \cos x) dx$$

6.2 Find the volume of the solid of revolution.

16. $y = \frac{1}{2}x^3$, $y = 4$, $x = 0$

rotate about $y = 4$



$$\int_0^2 \pi \left(4 - \frac{1}{2}x^3\right)^2 dx$$

$$= \int_0^2 \left(\frac{\pi}{4}x^6 - 4\pi x^3 + 16\pi\right) dx$$

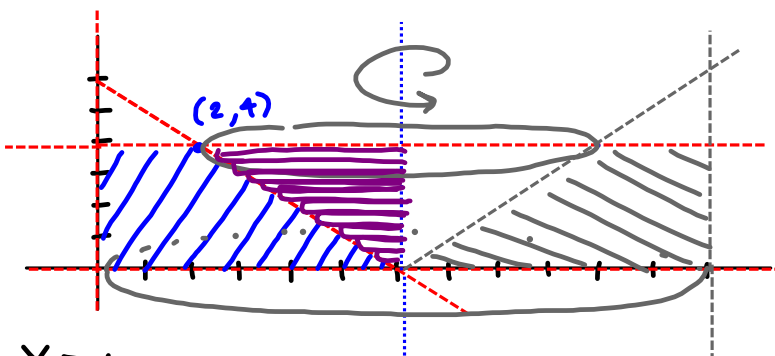
$$= \frac{\pi}{28}x^7 - \pi x^4 + 16\pi x \Big|_0^2$$

$$= \frac{32\pi}{7} - 16\pi + 32\pi$$

$$= \frac{32\pi}{7} + 16\pi = \frac{32\pi}{7} + \frac{112\pi}{7}$$

$$= \frac{144\pi}{7}$$

20. $y = 6 - x$, $y = 0$, $y = 4$, $x = 0$
around $x = 6$



$x = 6 - y$

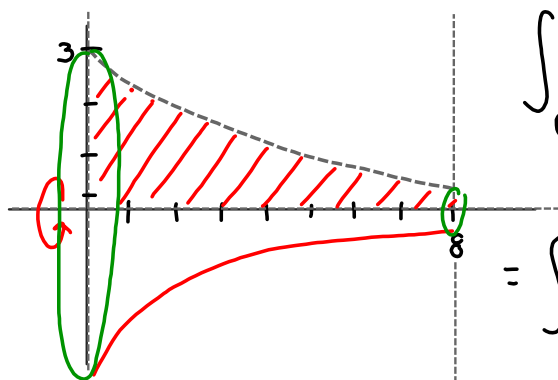
Volume = $\pi(6)^2 \cdot 4 - \int_0^4 \pi(y)^2 dy$

$r = 6 - (6 - y) = y$

$= 144\pi - \frac{\pi}{3}y^3 \Big|_0^4$
 $= 144\pi - \frac{64}{3}\pi = \frac{368\pi}{3}$

26. $y = \frac{3}{x+1}, y=0, x=0, x=8$

revolve about x-axis



$$\int_0^8 \pi \left(\frac{3}{x+1} \right)^2 dx$$

$$= \int_0^8 \frac{9\pi}{(x+1)^2} dx$$

$u = x+1$
 $du = dx$

$$\int 9\pi u^{-2} du$$

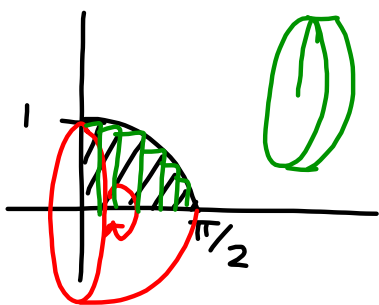
$$= -\frac{9\pi}{u} = -\frac{9\pi}{x+1}$$

$$= -\frac{9\pi}{8+1} - \left(-\frac{9\pi}{0+1} \right) =$$

$$= -\pi + 9\pi = \boxed{8\pi}$$

34. $y = \cos x, y=0, x=0, x = \frac{\pi}{2}$

revolve about x-axis



$$\int_0^{\pi/2} \pi (\cos x)^2 dx$$

$$= \int_0^{\pi/2} \left(\frac{\pi}{2} (\cos 2x) + \frac{\pi}{2} \right) dx$$

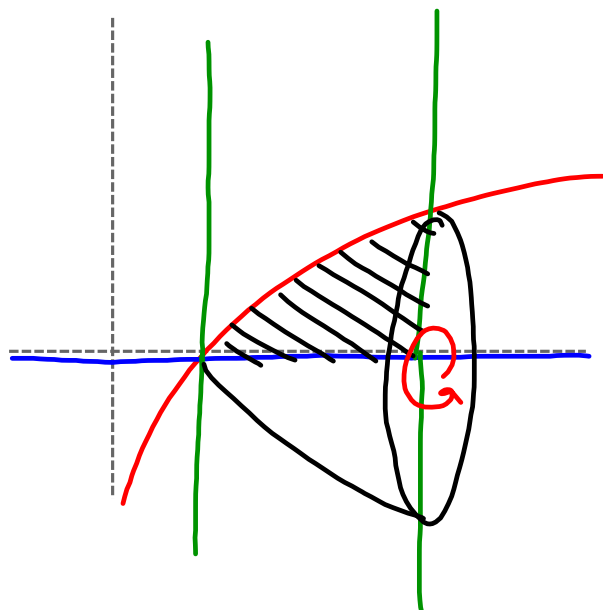
$$= \frac{\pi}{4} \sin 2x + \frac{\pi}{2} x \Big|_0^{\pi/2}$$

$$= \boxed{\frac{\pi^2}{4}}$$

$$\cos 2\theta = 2\cos^2 \theta - 1$$

$$\frac{\cos 2\theta + 1}{2} = \cos^2 \theta$$

36. $y = \ln x$, $y = 0$, $x = 1$, $x = 3$
about x-axis



$$\int_1^3 \pi (\ln x)^2 dx$$

Homework:

- 6.1 #1-9 odd; 19, 43
- 6.2 #11, 13, 17, 19, 21, 25, 29, 35