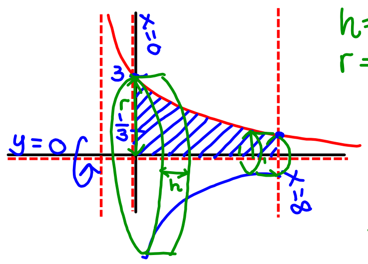
<u>Homework</u>:

- 6.1 #1-9 odd; 19, 43 — area between curves
- 6.2 #11, 13, 17, 19, 21, 25, 29, 35 — volume of solids of revolution
- 6.4 #5, 7, 13, 33, 35 — surface area of solids of revolution

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

revolve about x-axis



$h = dx$

$r = \frac{3}{x+1}$

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

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

Let $u = x+1$

$du = dx$

when $x=8$, $u=9$

when $x=0$, $u=1$

$$= 9\pi\int_1^9 \frac{du}{u^2}$$

$$= 9\pi\int_1^9 u^{-2}\,du$$

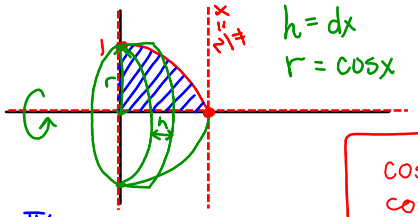
$$= 9\pi\left(\frac{-1}{u}\right)\Big|_1^9$$

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

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

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

revolve about x-axis



$h = dx$

$r = \cos x$

$$V = \int_0^{\pi/2} \pi \cos^2 x \, dx$$

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

$\cos 2x + 1 = 2\cos^2 x$

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

$$V = \int_0^{\pi/2} \pi \left(\frac{1}{2}\cos 2x + \frac{1}{2}\right) dx$$

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

$u = 2x$

$du = 2dx$

$\frac{1}{2} du = dx$

$\frac{\pi}{2} \cdot \frac{1}{2}$

$$= \int_{u=0}^{\pi} \left(\frac{\pi}{4}\cos u + \frac{\pi}{4}\right) du$$

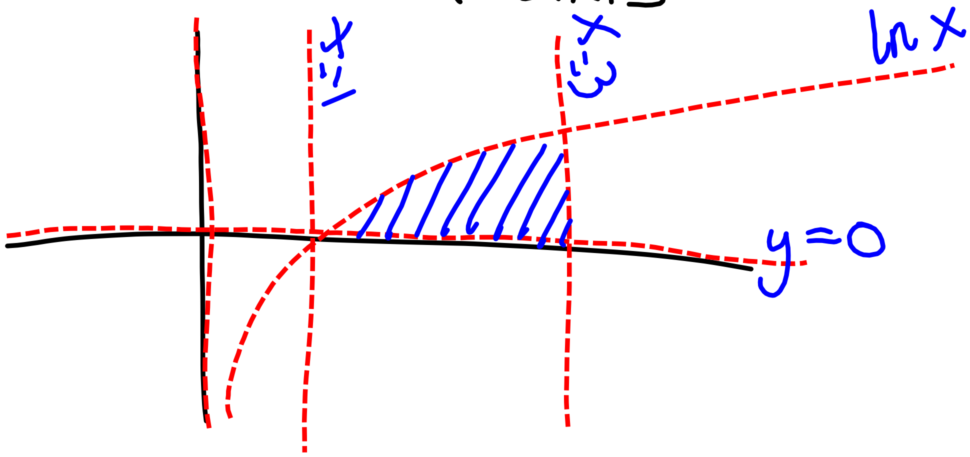
$$= \frac{\pi}{4}\sin u + \frac{\pi}{4} u \Big|_0^{\pi}$$

$$= \cancel{\frac{\pi}{4}\sin \pi}^{\,0} + \frac{\pi}{4}(\pi) - \left[\cancel{\frac{\pi}{4}\sin 0}^{\,0} + \cancel{\frac{\pi}{4}(0)}^{\,0}\right]$$

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

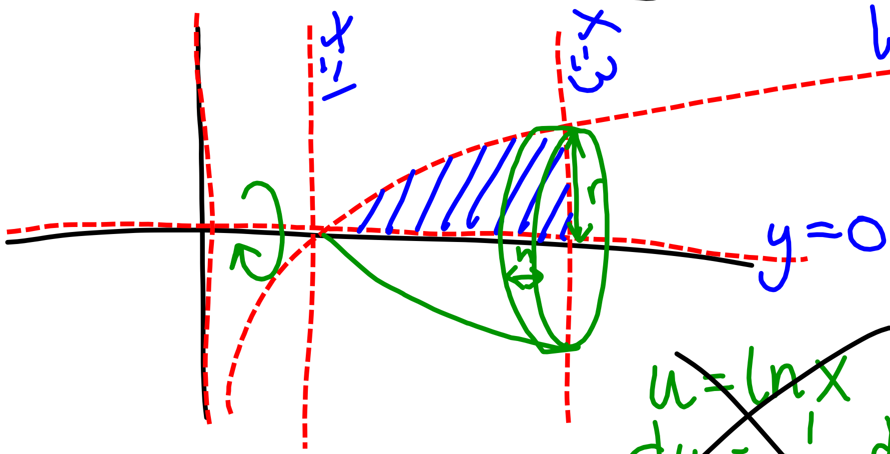
36. $y = \ln x$, $y = 0$, $x = 1$, $x = 3$

about x-axis



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

about x-axis



$h = dx$

$r = \ln x$

$$\boxed{V = \int_1^3 \pi(\ln x)^2\,dx}$$

~~$u = \ln x$~~

~~$du = \frac{1}{x}\,dx$~~

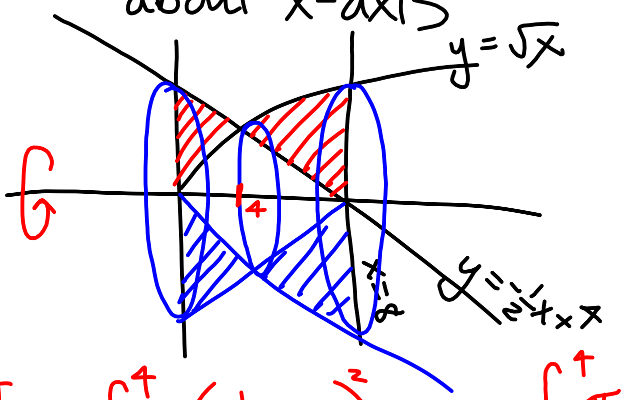
we don't know how yet. :(

30. $y = \sqrt{x},\ y = -\frac{1}{2}x + 4,\ x = 0,\ x = 8$

about x-axis

$\sqrt{x} = -\frac{1}{2}x + 4$

$x = 4$



$$V_0^4 = \int_0^4 \pi\left(-\tfrac{1}{2}x+4\right)^2 dx - \int_0^4 \pi(\sqrt{x})^2\,dx$$

$$V_4^8 = \int_4^8 \pi(\sqrt{x})^2\,dx - \int_4^8 \pi\left(-\tfrac{1}{2}x+4\right)^2 dx$$

$$V_{total} = V_0^4 + V_4^8$$