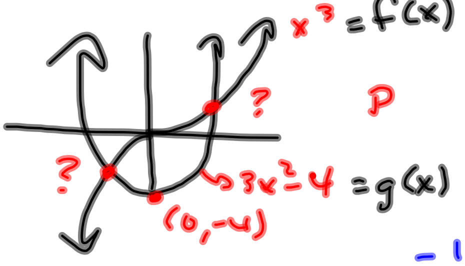
5.5, 5.6

\# 60 $x^3 - y = 0$

$3x^2 - y = 4$

$y = x^3$

$y = 3x^2 - 4$



P

$3x^2 - 4 = x^3$

$x^3 - 3x^2 + 4 = 0$

$\pm 1, \pm 2, \pm 4$

-1	1	-3	0	4
		-1	$+4$	-4
	1	-4	$+4$	0

$x^2 - 4x + 4 = (x-2)^2 = 0$

$x = 2$

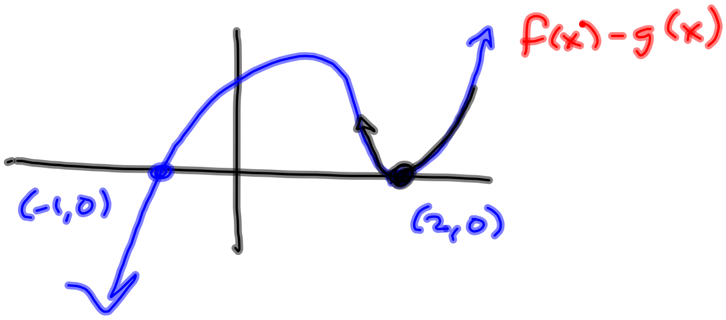
$f(x) - g(x) = h(x)$

$= \boxed{x^3 - 3x^2 + 4}$

$h(x) = (x+1)(x-2)^2$

x^3

...



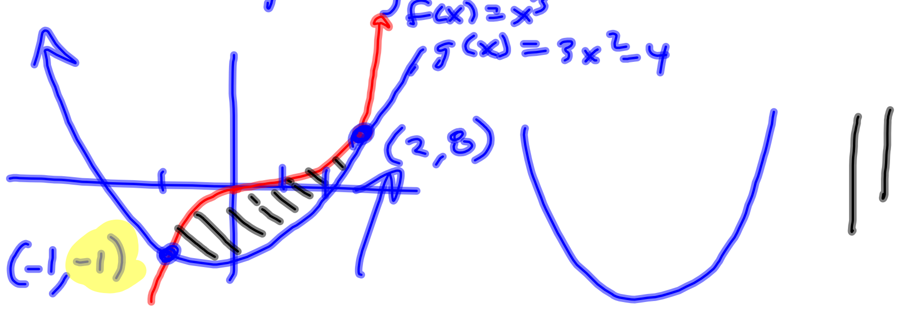
Th.3 says my 1st pic should be

$(-1)^3 = -1$

$3(-1)^2 - 4$

$= 3 - 4 = -1$

$2^3 = 8$



So, Area between is $\displaystyle\int_{-1}^{2} \left(f(x) - g(x)\right)dx$

$$= \int_{-1}^{2} (x^3 - 3x^2 + 4)\,dx = \left[\tfrac{1}{4}x^4 - x^3 + 4x\right]_{-1}^{2}$$

$$= \tfrac{1}{4}(16) - 8 + 8 - \left(\tfrac{1}{4}(-1)^4 - (-1)^3 + 4(-1)\right)$$

$$= 4 - \left(\tfrac{1}{4} + 1 - 4\right) = 4 - \tfrac{1}{4} + 3 = 7 - \tfrac{1}{4}$$

$$= \frac{28-1}{4} = \frac{27}{4}$$

$$\int_0^{\frac{\pi}{4}} \frac{\sin\theta}{\sin(\cos\theta)}\, d\theta$$

$u = \cos\theta$

$du = -\sin\theta \, d\theta$

$d\theta = \frac{du}{-\sin\theta}$

$\cos(0) = 1$

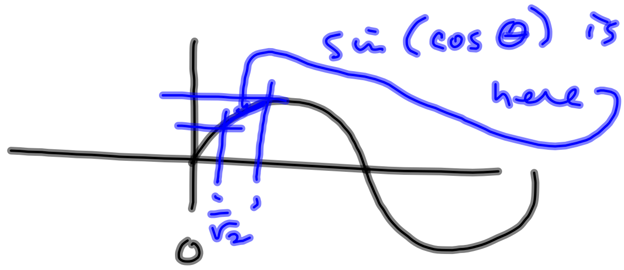
$\cos\left(\frac{\pi}{4}\right) = \frac{1}{\sqrt{2}}$ $\quad \frac{\pi}{2}$

on $\left[0, \frac{\pi}{4}\right]$, $\cos\theta \in \left[\frac{1}{\sqrt{2}}, 1\right]$

$\sin(\cos\theta) \in$

$$= \int_1^{\frac{1}{\sqrt{2}}} \frac{\cancel{\sin\theta}}{\sin(u)} \cdot \frac{du}{-\cancel{\sin\theta}}$$

$$= -\int_1^{\frac{1}{\sqrt{2}}} \frac{du}{\sin u}$$



$$= \boxed{\int_{\frac{1}{\sqrt{2}}}^{1} \csc u \, du}$$

But idiot teacher forgot we can't do $\int \csc u \, du$, yet.

$$\int (\csc u)\left(-\frac{\csc u + \cot u}{\csc u + \cot u}\right) du$$

$$= -\int \frac{(\csc^2 u + \csc u \cot u)}{\csc u + \cot u}\, du$$

$$= -\int \frac{\csc^2 u - \csc u \cot u}{\cot u + \csc u}\, du$$

Let $v = \cot u + \csc u$

$$= -\int \frac{dv}{v} = -\ln|v| + C$$

$$= -\ln|\csc u + \cot u| + C$$

$$\int \frac{\sqrt{x^3-3}}{\sqrt{x^{11}}}\,dx$$

$$\frac{x^3-3}{x^{11}} = \frac{x^3}{x^{11}} - \frac{3}{x^{11}} = \frac{1}{x^8} - \frac{3}{x^{11}} \quad *$$

$$\frac{x^3-3}{x^8 \cdot x^3} = \frac{1}{x^8}\left(\frac{x^3-3}{x^3}\right) = \frac{1}{x^8}\left(1-\frac{3}{x^3}\right)$$

$$\int \frac{1}{\sqrt{x^8}}\sqrt{1-\frac{3}{x^3}}\,dx$$

must assume $x>0$

$$= \int x^{-4}\left(1-3x^{-3}\right)^{\frac{1}{2}}dx \qquad \sqrt{x^8} = |x^4| = x^4$$

$u = 1-3x^{-3}$

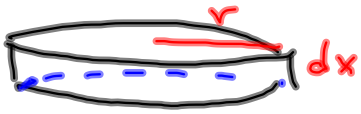
$du = 9x^{-4}\,dx$

$dx = \dfrac{du}{9x^{-4}}$

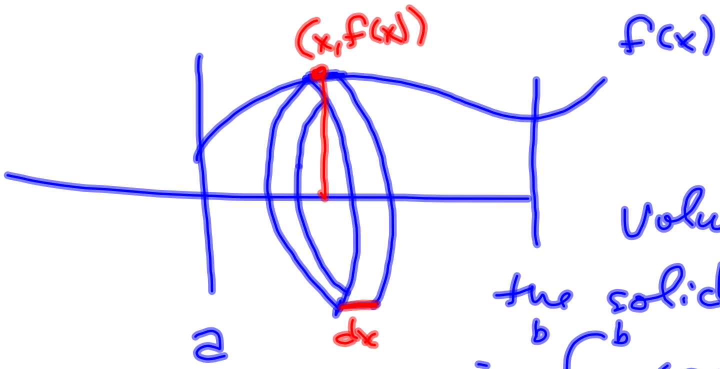
$$\int x^{-4}(u)^{\frac{1}{2}}\frac{du}{9x^{-4}} = \frac{1}{9}\int u^{\frac{1}{2}}du$$

Nov 6-12:45 PM

Scan
§6.1, 6.2



Volume = $\pi r^2 dx$



Volume of the solid of revolution is $\int_a^b \pi (f(x))^2 dx$