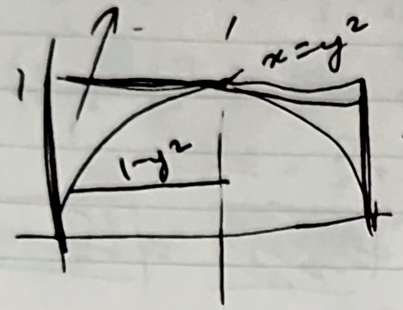
PS 23

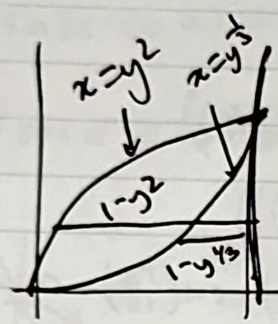
rotates ~~around~~ cylinder $= \int^{2}\pi \cdot 1 = \pi$

5d) 

$\pi - \int_0^1 \pi(1-y^2)^2\,dy$

$= \pi - \frac{8\pi}{15}$ (evaluated in class)

$= \boxed{\frac{7\pi}{15}}$

5e) 

$\int_0^1 (\pi(1-y^2)^2 - \pi(1-y^{1/3})^2)\,dy$

$= \pi\int_0^1 (1-2y^2+y^4-(1-2y^{\frac{1}{3}}+y^{\frac{2}{3}}))\,dy$

$= \pi\int_0^1 (y^4-2y^2+2y^{\frac{1}{3}}-y^{\frac{2}{3}})\,dy$

$= \pi\left[\frac{y^5}{5}-\frac{2y^3}{3}+\frac{2y^{4/3}}{4/3}-\frac{y^{5/3}}{5/3}\right]_0^1$

$= \pi\left(\frac{1}{5}-\frac{2}{3}+\frac{3}{4}\cdot 2-\frac{3}{5}\right)$

$= \pi\left(\frac{1}{5}-\frac{2}{3}+\frac{3}{2}-\frac{3}{5}\right)$

$= \pi\left(\frac{12}{60}-\frac{40}{60}+\frac{90}{60}-\frac{36}{60}\right) = \frac{26}{60}\pi = \boxed{\frac{13\pi}{30}}$

6a) $\pi\int_0^{\pi/2}\cos^2 x\,dx = \int_0^{\pi/2}\pi(\cos x)^2\,dx$

Area of $y=\cos x$ between $x=0$, $x=\frac{\pi}{2}$ rotated about the x axis.

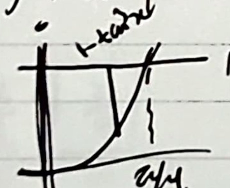
6b) $\pi\int_0^1 (y^4-y^8)\,dy = \int_0^1 (\pi(y^2)^2-\pi(y^4)^2)\,dy$

Area between $x=y^2$, $x=y^4$ between $y=-1$, $y=1$ revolved around y axis.

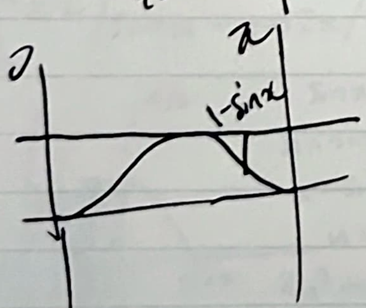
7a) $\tan^3 x = 1$

$\tan x = 1$

$x = \frac{\pi}{4}$.



$\int_0^{\pi/4}\pi(1-\tan^3 x)^2\,dx$

b) 

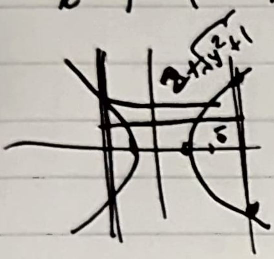
$\int_0^{\pi}\pi(1-\sin x)^2\,dx$

~~$(\sqrt{y^2})$~~ ~~4~~ $x^2 - y^2 = 1$

$x^2 = 10$

$x = \sqrt{10}$

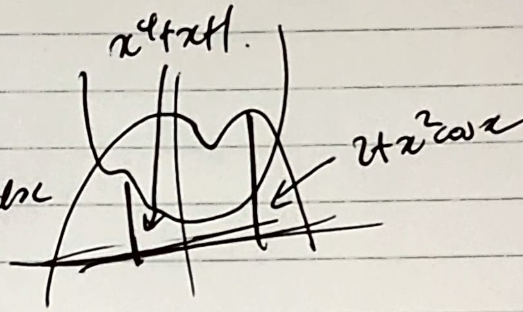
10) $x^2 - y^2 = 1$ $\quad x^2 = y^2 + 1$ $\quad$ ~~$x^2 - 1 = y^2$~~ ~~$y = \sqrt{x^2 - 1}$~~



$x = \sqrt{y^2+1}$

$$\int_{-\sqrt{10}}^{\sqrt{10}} \left(\pi(5)^2 - \pi\left(2+\sqrt{y^2+1}\right)^2\right) dy$$

8 $\quad$ Intersect: $x = -1.288$ $\quad x = 0.884$



$$A \approx \int_{-1.288}^{0.884} \left(\pi\left(2+x^2\cos x\right)^2 - \pi\left(x^4+x+1\right)^2\right) dx$$

$\approx$ ~~[illegible]~~ 23.280 .