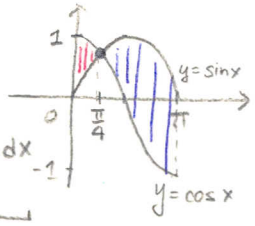
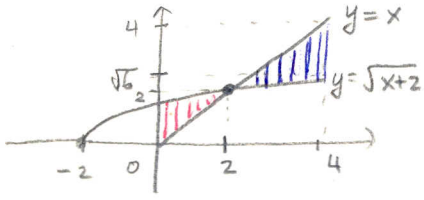
#1. (1) $\int_0^{\pi} |\sin x - \cos x| \, dx$



$= \underbrace{\int_0^{\frac{\pi}{4}} \cos x - \sin x \, dx}_{\text{area of III}} + \underbrace{\int_{\frac{\pi}{4}}^{\pi} \sin x - \cos x \, dx}_{\text{area of III}}$

(2) $\int_0^4 |\sqrt{x+2} - x| \, dx$



$= \int_0^2 \sqrt{x+2} - x \, dx + \int_2^4 x - \sqrt{x+2} \, dx$

$\sqrt{x+2} = x$ (so $x \geq 0$)

$x+2 = x^2$

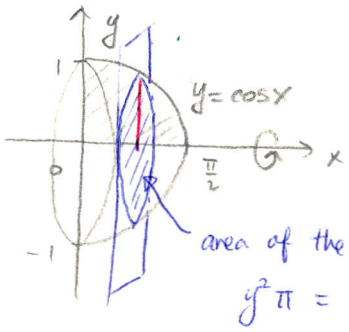
$x^2 - x - 2 = 0$

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

$x \neq -1$ or $x = 2$

#2. (1) $\pi \int_0^{\frac{\pi}{2}} \cos^2 x \, dx$

: volume of the solid obtained by rotating the region bounded by $y = \cos x$ on $[0, \frac{\pi}{2}]$, $x = 0$, and $y = 0$ about the x-axis.



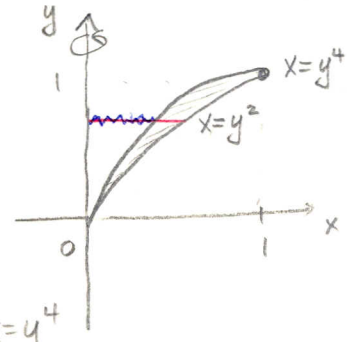
area of the cross section

$y^2 \pi = \cos^2 x \cdot \pi$.

volume $= \int_0^{\frac{\pi}{2}} \cos^2 x \cdot \pi \, dx$.

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

: volume of the solid obtained by rotating the region bounded by $x = y^2$ an $x = y^4$ in the first quadrant about the y-axis.



outer radius $x = y^2$

inner radius $x = y^4$

- area of the washer made by rotating —

$(y^2)^2 \pi - (y^4)^2 \pi$

- volume

$\int_0^1 y^4 \pi - y^8 \pi \, dy$

#3. $\pi \int_0^3 (4 - (x^2 - 2x))^2 - (4 - x)^2 \, dx$

#4. $\pi \int_0^4 (2+y)^2 - (2 + \frac{y^2}{4})^2 \, dy$

#5 $\pi \int_0^2 (4y^2) - (y^3)^2 \, dy$

#6 $\pi \int_1^4 (x^2 - 4x + 5)^2 \pi \, dx$

Will do these problems in class on 2/11 (Fri.) before the quiz.