Good Morning :-)

(1) Area (graph 3 fctns only)

(2) Volume any method.

(2) length $\begin{cases} ax^m + bx^n & \begin{cases} m+n=2 \\ abmn=-\frac{1}{4} \end{cases} \\ ae^{mx}+be^{nx} & \begin{cases} m=-n \\ abmn=-\frac{1}{4} \end{cases} \end{cases}$

$L = \begin{cases} ax^m \mp bx^n \\ ae^{mx} - be^{nx} \end{cases}$

(1) Surface $f' \Rightarrow \sqrt{1+f'^2} = \bar{f}'$

(1) mass

(1) Force

(1) derivative ✓

(2) Integration ✓ (a) (b)

$\begin{cases} \cosh x = \dfrac{e^x+e^{-x}}{2} \\ \sinh x = \dfrac{e^x-e^{-x}}{2} \end{cases}$

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less 10 → (1 → scratch)

1st → your name on it

conversation: type: $\begin{cases} \text{done} \\ \text{\# pages} \\ \text{you are taking of exam} \end{cases}$

- Please wait until you get permission to be dismissed.

- If you take a picture (low resolution)

1) A: $4x^2+y=4$ $\quad$ $x^4-y=1$

$y=4-4x^2$ $\quad$ $y=x^4-1$

$x^4-1=4-4x^2$

$x^4+4x^2-5=0$

$x^2=1 \cancel{-5}$

$\underline{x=\pm 1}$

$A=\int_{-1}^{1}(4-4x^2-x^4+1)\,dx$

$=\int_{-1}^{1}(5-4x^2-x^4)\,dx$ $\quad 2\Big(\int_0^1$

$=5x-\frac{4}{3}x^3-\frac{1}{5}x^5\Big|_{-1}^{1}$

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

$=10-\frac{8}{3}-\frac{2}{5}$

$=\frac{150-40-6}{15}$

$=\frac{104}{15}$ unit^2

\# V? $y=4-x^2$ $\quad 0\le x\le 2$ $\quad$ x-axis

$$V=\pi\int_0^2 (4-x^2)^2\,dx$$

$$=\pi\int_0^2 (16-8x^2+x^4)\,dx$$

$$=\pi\left(16x-\frac{8}{3}x^3+\frac{1}{5}x^5\right|_0^2$$

$$=\pi\left(32-\frac{64}{3}+\frac{32}{5}\right)$$

$$=\frac{32(15-10+3)}{15}\pi$$

$$=\frac{256\pi}{15}\ \text{unit}^3$$

V? $x=-y^2+4y=0$ $\quad$ y-axis

1.4

4/ V? $y=\frac{1}{2}x^2+1$

y-axis

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

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

$$=2\pi\left(x^2-\frac{1}{8}x^4\right|_0^2$$

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$$=2\pi(4-2)$$

$$=4\pi\ \text{unit}^3$$

V? $\quad y = x^2 \quad y = 4x - x^2 \quad \sim \underbrace{x = 4}_{\parallel\ y\text{-axis}}$

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

$2x^2 - 4x = 0$

$x = 0, 2$

$$V = 2\pi \int_0^2 (4-x)\left(4x - \overbrace{x^2 - x^2}^{-2x^2}\right)\, dx$$

$$= 2\pi \int_0^2 (16x - 12x^2 + 2x^3)\, dx$$

$$= 4\pi \left(8x^2 - 2x^3 + \frac{1}{4}x^4\right|_0^2$$

$$= 4\pi(32 - 32 + 4)$$

$$= 16\pi \text{ unit}^3$$

$f(x) = \frac{2}{3}x^{3/2} - \frac{1}{2}x^{1/2} \qquad 1 \le x \le 4 \quad L?$

$m + n = \frac{3}{2} + \frac{1}{2} = 2$ ✓

$a\,m\,b\,n: \frac{2}{3}\left(\frac{3}{2}\right)\left(-\frac{1}{2}\right)\left(\frac{1}{2}\right) = -\frac{1}{4}$ ✓

$$L = \frac{2}{3}x^{3/2} + \frac{1}{2}x^{1/2} \Big|_1^4$$

$$= \frac{16}{3} + 1 - \frac{2}{3} - \frac{1}{2}$$

$$= \frac{14}{3} + \frac{1}{2}$$

$$= \frac{31}{6} \text{ unit}$$

4? $f(y) = 2e^{\sqrt{2}y} + \frac{1}{16}e^{-\sqrt{2}y}$ $0 \le y \le \frac{\ln 2}{\sqrt{2}}$

$m = -n$ ✓ $a = 2,\ m = \sqrt{2},\ b = \frac{1}{16}$
$n = -\sqrt{2}$

$abmn = 2(\sqrt{2})\left(\frac{1}{16}\right)(-\sqrt{2}) = -\frac{1}{4}$ ✓

$$L = 2e^{\sqrt{2}y} - \frac{1}{16}e^{-\sqrt{2}y}\Big|_0^{\ln 2/\sqrt{2}}$$

$e^{\ln x} = x$

$e^{-\ln x} = \frac{1}{x}$

$= 2(2) - \frac{1}{16}\left(\frac{1}{2}\right)$

$= 4 - \frac{1}{32}$

$= \frac{127}{32}$ unit

5? $y = x^{3/2} - \frac{1}{3}x^{1/2}$ $1 \le x \le 2$ ∾ x-axis

$m + n = \frac{3}{2} + \frac{1}{2} = 2$

$abmn = 1\left(\frac{3}{2}\right)\left(-\frac{1}{3}\right)\left(\frac{1}{2}\right) = -\frac{1}{4}$ ✓

$y' = \frac{3}{2}x^{1/2} - \frac{1}{6}x^{-1/2}$

$$S = 2\pi\int_1^2 \left(x^{3/2} - \frac{1}{3}x^{1/2}\right)\left(\frac{3}{2}x^{1/2} + \frac{1}{6}x^{-1/2}\right)dx$$

$$= 2\pi\int_1^2 \left(\frac{3}{2}x^2 + \frac{1}{6}x - \frac{1}{2}x - \frac{1}{18}\right)dx$$

$$= 2\pi\int_1^2 \left(\frac{3}{2}x^2 - \frac{1}{3}x - \frac{1}{18}\right)dx$$

$$S = 2\pi \left(\frac{1}{2}x^3 - \frac{1}{6}x^2 - \frac{1}{18}x \right|_1^2$$

$$= 2\pi \left(4 - \frac{2}{3} - \frac{1}{9} - \frac{1}{2} + \frac{1}{6} + \frac{1}{18} \right)$$

$$= 2\pi \left(4 + \frac{-12 - 2 - 9 + 3 + 1}{18} \right)$$

$$= 2\pi \left(4 - \frac{19}{18} \right)$$

$$\begin{array}{r} 72 \\ - 19 \\ \hline 53 \end{array}$$

$$= \boxed{\frac{53\pi}{9} \text{ unit}^2}$$

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m ? $\rho(x) = x\sqrt{2 - x^2}$ $\quad 0 \le x \le 1$

$$m = \int_0^1 x\sqrt{2 - x^2}\, dx$$

$$= -\frac{1}{2} \int_0^1 (2 - x^2)^{1/2}\, d(2 - x^2)$$

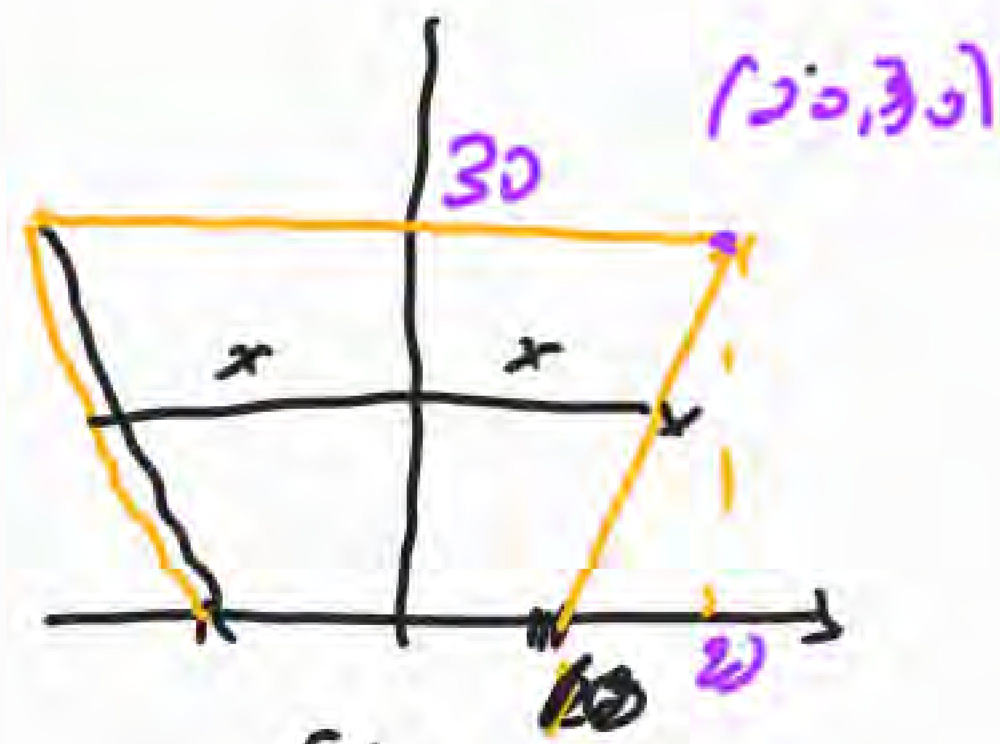
$$= -\frac{1}{3} (2 - x^2)^{3/2} \Big|_0^1$$

$$= \boxed{-\frac{1}{3} \left(1 - 2^{3/2} \right) \text{ unit}}$$

F ? $\rho = 1000 = 10^3$

$g = 9.8 = \frac{98}{10}$

$$F = \rho g \int_0^a (a-y)\, w(y)\, dy$$



$(10,0)$

$(20,30)$

$y = 3(x-10)$

$\frac{1}{3}y + 10 = x$

$w(y) = 2x$

$= \frac{2}{3}y + 20$

$$F = 98 \times 10^2 \int_0^{30} (30-y)\left(\frac{2}{3}y + 20\right) dy$$

$$= 98 \times 10^2 \int_0^{30} \left(20y + 600 - \frac{2}{3}y^2 - 20y\right) dy$$

$$= 9800 \int_0^{30} \left(600 - \frac{2}{3}y^2\right) dy$$

$$= 9800 \left(600y - \frac{2}{9}y^3 \right)\Big|_0^{30}$$

$$= 9800 \left(18 \times 10^3 - 6 \times 10^3\right)$$

$$= 98 \times 10^5 (12)$$

$$= 1176 \times 10^5 \text{ unit}$$

$$f(x) = \frac{\ln x}{\ln x + 1}$$

$$f'(x) = \frac{\frac{1}{x}(\ln x + 1) - \frac{1}{x}\ln x}{(\ln x + 1)^2}$$

$$= \boxed{\frac{1}{x(\ln x + 1)^2}}$$

$$\int_e^{e^2} \frac{dx}{x \ln^3 x} = \int_e^{e^2} (\ln x)^{-3}\, d(\ln x)$$

$$= -\frac{1}{2} \frac{1}{(\ln x)^2} \Big|_e^{e^2}$$

$$= -\frac{1}{2}\left(\frac{1}{4} - 1\right)$$

$$= \boxed{\frac{3}{8}}$$

$$\int_0^{\ln 2} 4e^{-\theta}\sinh\theta\,d\theta = 2\int_0^{\ln 2} e^{-\theta}(e^{\theta}-e^{-\theta})\,d\theta$$

$$= 2\int_0^{\ln 2}(1-e^{-2\theta})\,d\theta$$

$$= 2\left(\theta+\tfrac{1}{2}e^{-2\theta}\right)\Big|_0^{\ln 2}$$

$$= 2\left(\ln 2+\tfrac{1}{2}e^{-2\ln 2}-\tfrac{1}{2}\right)$$

$$= 2\left(\ln 2+\tfrac{1}{8}-\tfrac{1}{2}\right)$$

$$= 2\ln 2-\tfrac{3}{4}$$

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solid washer (x-axis) disk shell

Surface, Force.

Set up the Integration