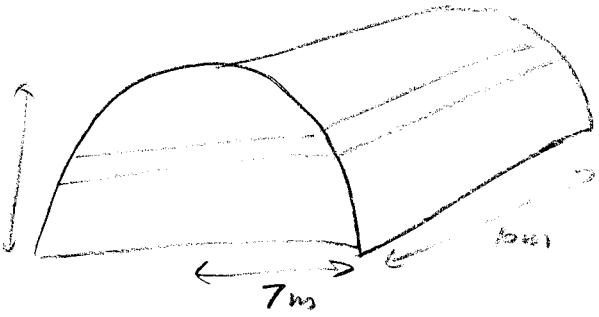
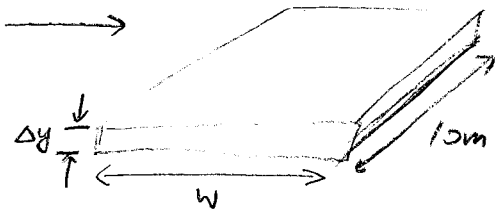
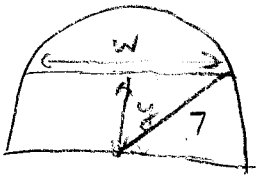
3 (a)







$\left(\frac{w}{2}\right)^2 + y^2 = 7^2$

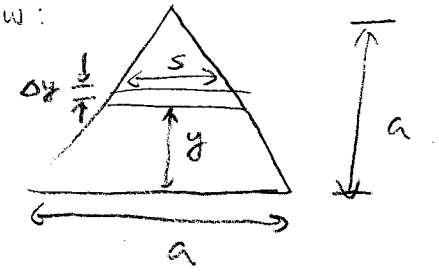
$w = 2\sqrt{49 - y^2}$

Volume ~~of~~ slice = $w \cdot 10 \cdot \Delta y$

$= 2\sqrt{49-y^2} \times 10 \times \Delta y$

$\Rightarrow \int_0^7 20\sqrt{49-y^2}\, dy$

4 (a) Side view:



$a = 2$ m.

Similar triangles

$\frac{a-y}{a} = \frac{s}{a}$

volume of slice = $s^2 \times \Delta y$

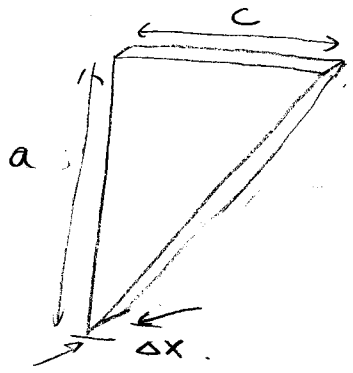
$= (a-y)^2 \Delta y$

$= (2-y)^2 \Delta y$

$\Rightarrow \int_0^2 (2-y)^2\, dy$

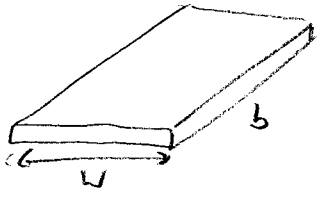
[5]

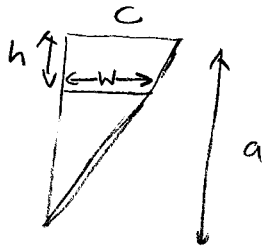
(a) Hint: slices are triangles



Volume = $\frac{1}{2} a c \Delta x$

(c) Slices are rectangles.





Similar triangles:

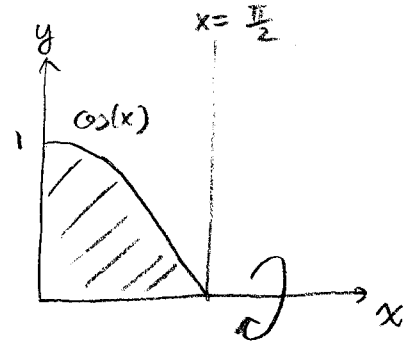
$$\frac{a-h}{w} = \frac{a}{c}$$

$$w = c\left(1 - \frac{h}{a}\right)$$

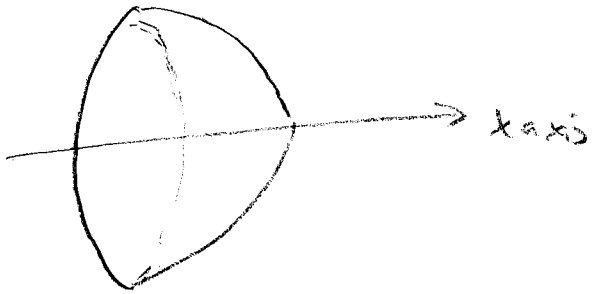
Volume $= w \cdot b \cdot \Delta h$

$= c\left(1 - \frac{h}{a}\right) \cdot \Delta h$

[1]

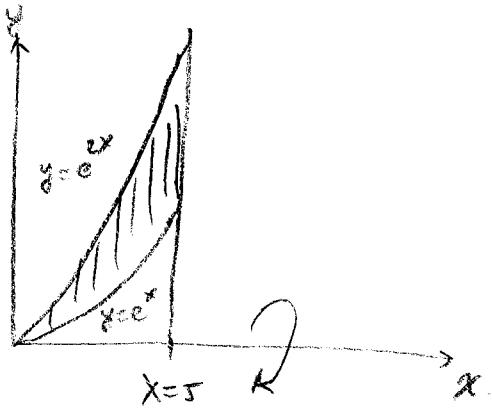


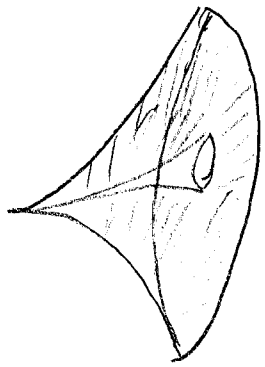
Rotate →



$\int_0^{\pi/2} \pi \cos^2(x)\, dx$ (use table)

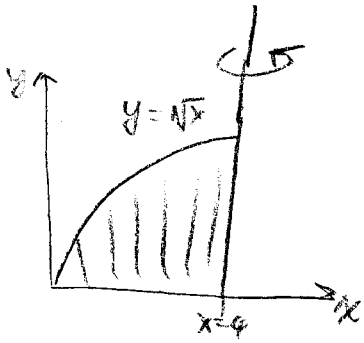
[2]



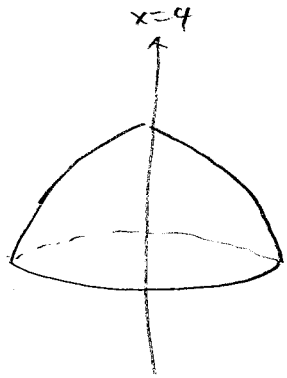


$\int_0^5 \pi \left(e^{4x} - e^{2x}\right) dx.$

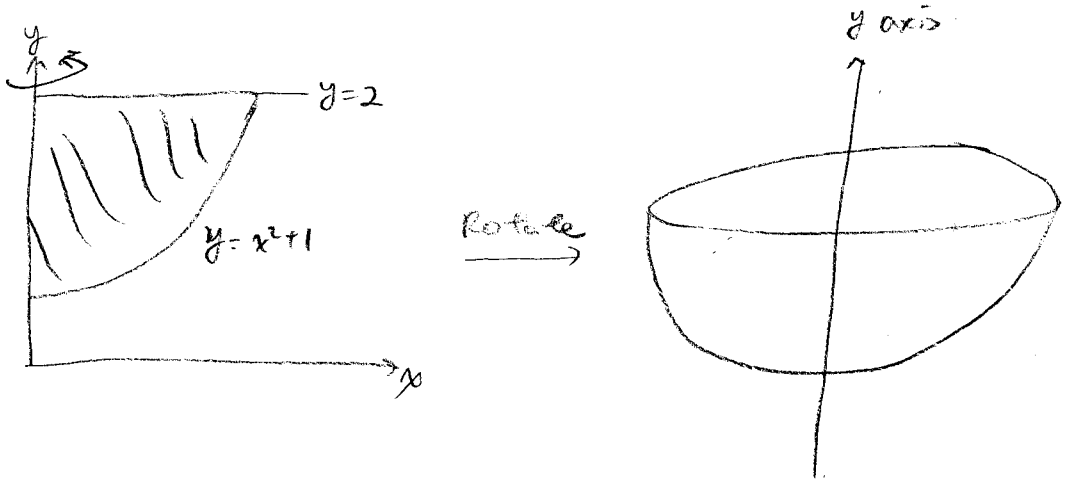
[3]



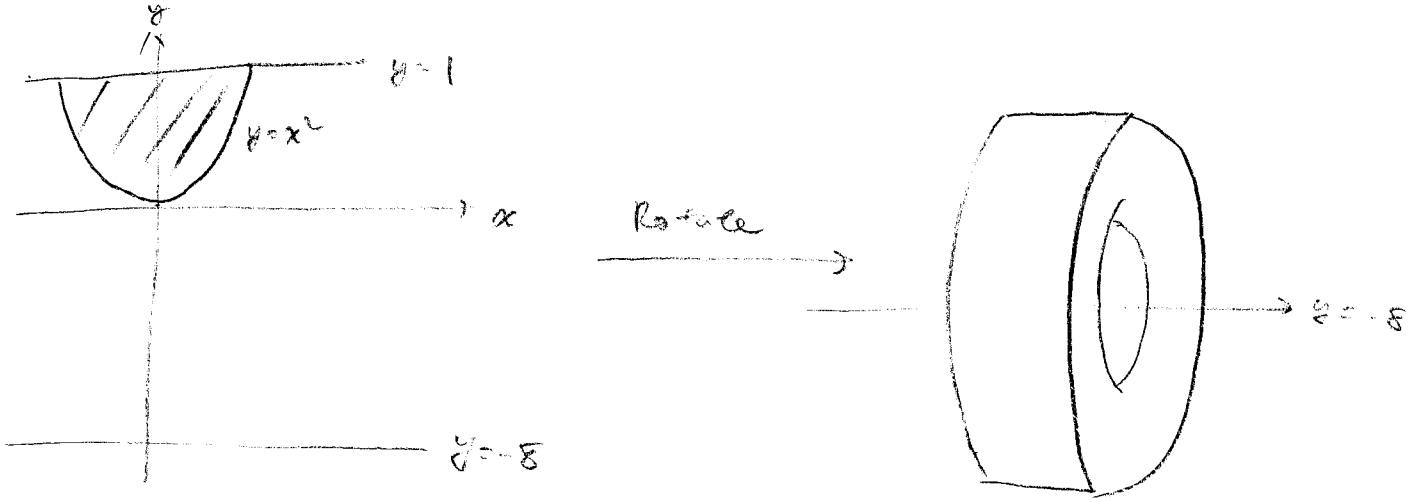
rotate around x = 4 →



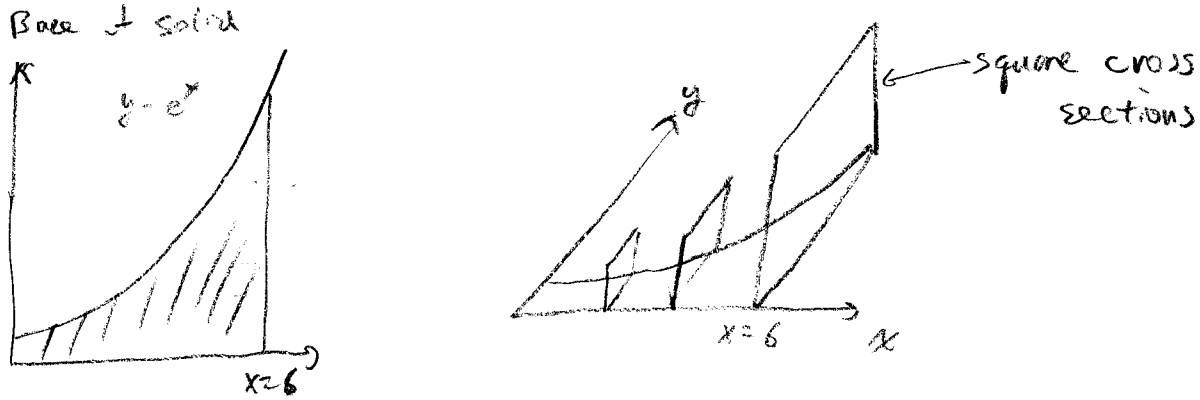
14


y
y=2
y=x²+1
x
Rotate
y axis

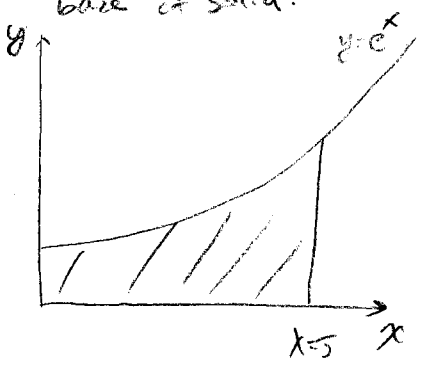
15

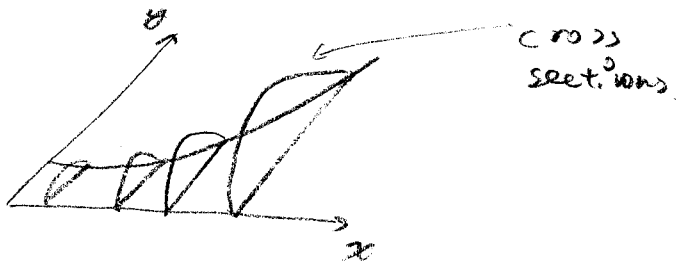

y
y=1
y=x²
x
y=-8
Rotate
x=-8

16

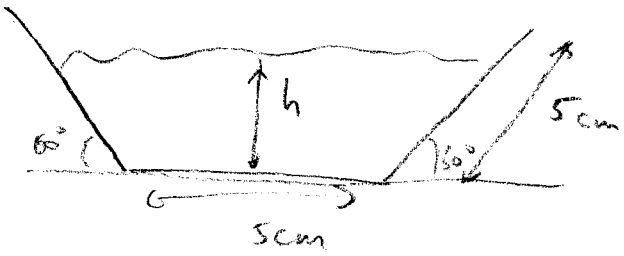

Base of solid
y
y=e^x
x=6
square cross sections
y
x=6
x

7 base of solid:



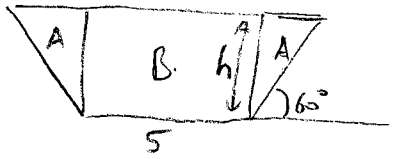


8 (c)



90cm long

Area = 2A + B



$B = 5h$

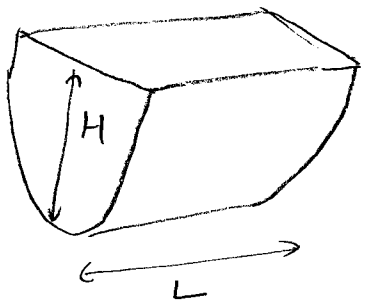
$A = \frac{1}{2} h \cdot \text{base}$

$= \frac{1}{2} h \cdot h \cdot \tan(60°)$

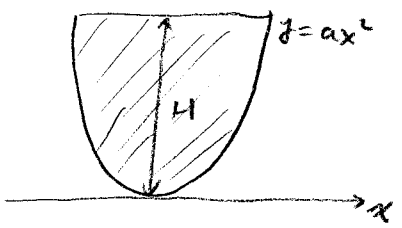
$= \frac{h^2}{2\sqrt{3}}$

Volume $= \left(\frac{h^2}{\sqrt{3}} + 5h\right) \cdot 90$

35 from text:



Cross section:



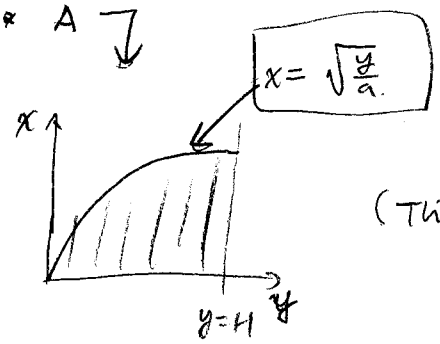
max weight of boat + cargo

= max weight of displaced water

= $\frac{10000 \text{ Newtons}}{m^3} \times$ Volume of boat

Volume = area of cross section $\times L$

Area = $2 * A$



(This is the cross section, turned sideways)

$= 2 \int_0^H \sqrt{\frac{y}{a}}\, dy$

$= \frac{2}{\sqrt{a}} \cdot \frac{2}{3} H^{3/2}$

So $\boxed{\text{Weight} = 10000 \cdot \frac{4}{3} \cdot \frac{1}{\sqrt{a}} \cdot H^{3/2} \cdot L}$