EXAMPLE 1 A dam has the shape of the trapezoid shown in Figure 2. The height is 20 m and the width is 50 m at the top and 30 m at the bottom. Find the force on the dam due to hydrostatic pressure if the water level is 4 m from the top of the dam.

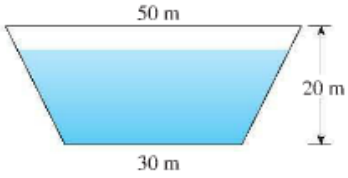


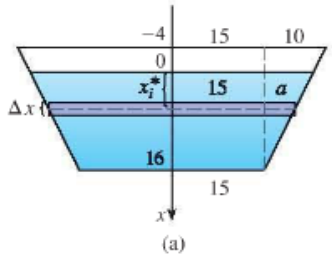
FIGURE 2

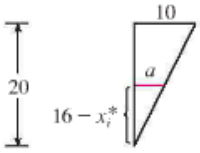
$F = ma = \rho g A$

ρ = "roh" = density in kg/m^2 ?

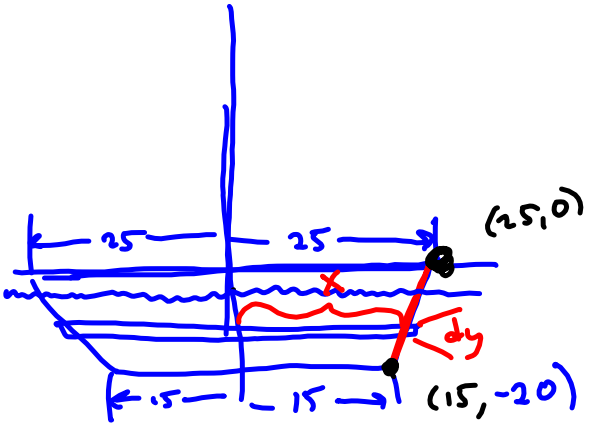
$g = -9.8\ m/s^2$

$d, \beta, \gamma, \delta,$





4



$F = P \cdot A = \rho g d \cdot A$

$$\int_{-20}^{-4} \rho g d \cdot A$$

$$\int_{-20}^{-4} 1000 \cdot (-9.8)\, y \cdot 2\left(\tfrac{1}{2}y + 25\right) dy$$

y = depth

$\rho = 1000\ kg/m^3$

$g = -9.8\ m/s^2$

(25,0), (15,−20)

$y = m(x - x_1) + y_1$

$= \frac{-20-0}{15-25} = \frac{-20}{-10} = 2 = m$

$y = 2(x-25) + 0$

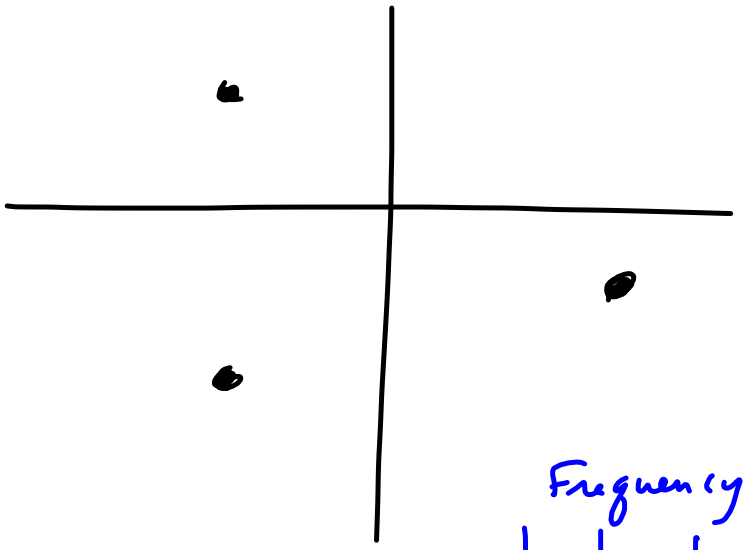
$y = 2x - 50$

$2x = y + 50$

$x = \frac{1}{2}y + 25$

M_y = Average of the x's (Times weight)

M_x = " " " " " " "



Frequency Distribution

x	1	2	3	4
f	3	7	2	4

$\bar{x} = \dfrac{\sum m_i x_i}{\sum m_i} = M_y$

1, 1, 1, 2, 2, 2, 2, 2, 2, 2, 3, 3, 4, 4, 4, 4

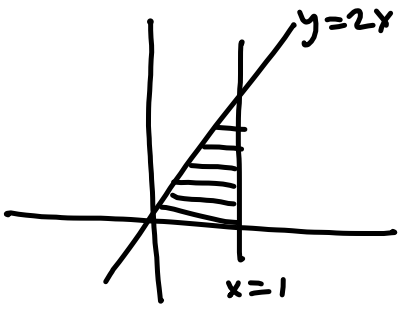
$\bar{y} = \dfrac{\sum m_i y_i}{\sum m_i} = M_x$

Average $= \bar{x} = \dfrac{\sum f_i x_i}{\sum f_i}$

Center of Mass is $(\bar{x}, \bar{y})$

$\bar{x} = \dfrac{3 \cdot 1 + 7 \cdot 2 + 2 \cdot 3 + 4 \cdot 4}{3 + 7 + 2 + 4}$

$y = 2x$, $y = 0$, $x = 1$



Find centroid.

$$M_y = \frac{\sum m_i x_i}{\sum m_i} = \frac{\int_0^1 2x \cdot x \, dx}{\int_0^1 2x \, dx}$$, I think.

I'm not believing.

§8.3 #5, 8, 25, 29, 31
with apologies.

Should be finished w/ §8.2 &
starting §8.3 this week.
A little bit from §8.4, 8.5 &
then a brief survey of Ch 9.