

a)  $F_{\text{bottom}} = F = PA$

$A = 2 \cdot 5 = 10 \text{ ft}^2$

$P = \rho g h, h = 3'$

$F_{\text{bottom}} = (62.5 \frac{\text{lb}}{\text{ft}^3}) (30 \text{ ft}^3)$

$\rho g = 62.5 \text{ lb/ft}^3$

a)  $P_{\text{bottom}} = 187.5 \frac{\text{lb}}{\text{ft}^2}$

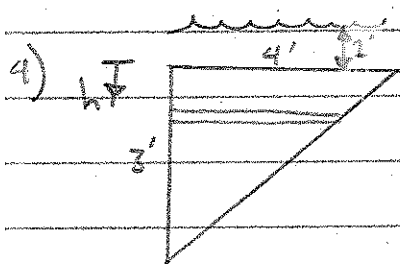
b)  $F_{\text{bottom}} = 1875 \text{ lb}$

c)  $F = PA$

$P = \rho g h, A = 2dh$

$F = 2\rho g \int_0^3 h dh = \rho g h^2 \Big|_0^3 = 9(62.5)$

$F_{\text{end}} = 562.5 \text{ lb}$



$F = PA$

$P = \rho g d, d = (h+1)$

$A = (4 - \frac{4}{3}h)dh$   
 $= -\frac{4}{3}(h-3)dh$

$F = \frac{4}{3}\rho g \int_0^3 (h+1)(h-3)dh$

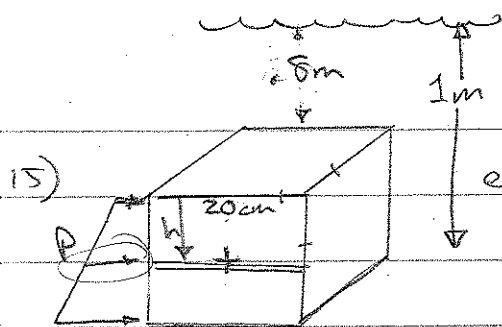
$F = \frac{4}{3}\rho g \int_0^3 (h^2 - 2h - 3)dh$

$F = -\frac{4}{3}\rho g \left( \frac{h^3}{3} - h^2 - 3h \right) \Big|_0^3$

$F = -\frac{4}{3}\rho g (9 - 9 - 9)$

$F = 12\rho g, \rho g = 62.5 \frac{\text{lb}}{\text{ft}^3}$

$F = 750 \text{ lb}$



estimate  $F_{\text{TOP}}$   $F_{\text{TOP}} = PA$ ,  $A = (.2)^2$   
 $P = \rho g \cdot .8 \text{ m}$

a)  $F_{\text{TOP}} = 314 \text{ N}$

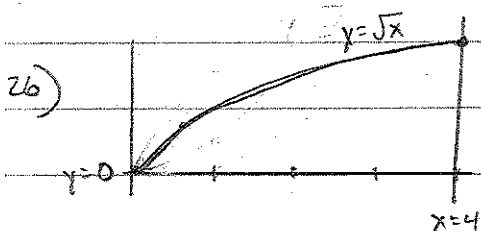
b) estimate  $F_{\text{SIDE}}$   $F_s = PA$   $A = .2^2$   
 $P_{\text{ave}} = \rho g (0.9 \text{ m})$

$F_s = (.2)^2 (0.9) \rho g = 352.8 \text{ N}$

$F_{\text{SIDE}} \approx 352.8 \text{ N}$

$F_{\text{SIDE}} = \rho g \int_0^{.2} (h + .8) (.2 dh)$   $\text{depth} = (h + .8)$   
 $A = .2 dh$   
 $= .2 \rho g \left( \frac{h^2}{2} + .8h \right) \Big|_0^{.2} = .2 \rho g (.02 + .16) = 352.8 \text{ N}$

$F_{\text{SIDE}} = 352.8 \text{ N}$



$A = \int_0^4 (x^{1/2} - 0) dx = \frac{2}{3} x^{3/2} \Big|_0^4 = \frac{2}{3} (8) = \frac{16}{3}$

$\bar{x} = \frac{1}{A} \int_0^4 x (x^{1/2} - 0) dx = \frac{3}{16} \int_0^4 x^{3/2} dx$   
 $= \frac{3}{16} \left( \frac{2}{5} x^{5/2} \right) \Big|_0^4 = \frac{3}{40} (32) = \frac{12}{5}$

$\bar{x} = \frac{12}{5}$

$\bar{y} = \frac{1}{A} \int_0^4 \frac{1}{2} (x^{1/2} - 0)^2 dx = \left( \frac{1}{2} \right) \frac{3}{16} \int_0^4 x dx = \frac{3}{32} \frac{x^2}{2} \Big|_0^4$

$= \frac{3}{32} \cdot \frac{16}{2} = \frac{3}{4}$

$\bar{y} = \frac{3}{4}$