sec 6.6 Fluid Pressure & Fluid Force

Pressure - the force per unit area over the surface of a body
Fluid Pressure - on an object at depth h in a liquid $P = wh$
where w is the weight-density of the liquid per unit of volume.

Pascal's Principle - the pressure exerted by a fluid at a depth h is transmitted equally in all directions
fluid force - (on a submerged horizontal surface) $\rightarrow$ area A: $F = PA$
(pressure)(area).

force exerted by a field - $F = w\int_c^d h(y)L(y)\,dy$ where w is constant weight-density against a submerged vertical plane, $h(y)$ is the depth of the fluid at y and $L(y)$ is the horizontal length of the region at y.

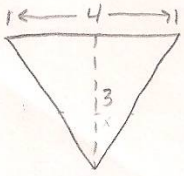
P.456

2) $F = (62.4)(5)(18) = \underline{5616\text{ lb}}$

4) $F_T = (62.4)(h)(48) = 2995.2h$

$F_B = (62.4)(h+4)(48) = 2995.2h + 11980.8$

Bouyant force $= F_B - F_T$
$= 2995.2h + 11980.8 - 2995.2h$
$= \underline{11980.8\text{ lb}}$

6) 

$F = 62.4\int_0^3 (3-y)\left(\frac{4}{3}y\right)dy$

$F = 62.4\cdot\frac{4}{3}\int_0^3 3y - y^2\,dy$

$F = 83.2\left[\frac{3}{2}y^2 - \frac{1}{3}y^3\right]_0^3$

$F = 83.2\left[\frac{27}{2} - \frac{9}{1}\right]$

$F = 83.2\left[\frac{9}{2}\right] = \underline{374.4\text{ lb}}$

14) $F = 62.4\int_0^5 (6-y)(1)\,dy$

$F = 62.4\left[6y - \frac{1}{2}y^2\right]\Big|_0^5$

$F = 62.4\left[30 - \frac{25}{2}\right] = \underline{1092\text{ lb}}$

16) $F = 140.7\int_0^4 (4-y)(6)\,dy$

$F = 844.2\int_0^4 4-y\,dy$

$F = 844.2\left[4y - \frac{1}{2}y^2\right]\Big|_0^4$

$F = 844.2[16-8] = \underline{6753.6\text{ lb}}$

24) $F = wk(\pi r^2)$

$F = (64)(15)(\pi(5^2))$

$F = \underline{240\pi\text{ lb}}$