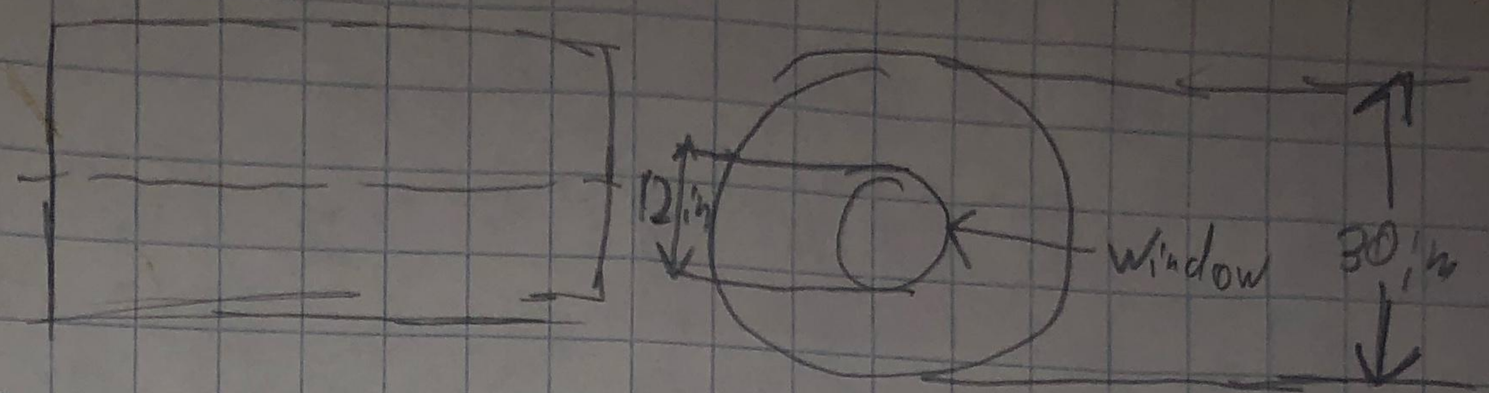
4.2



$D = 30in \quad p = 14.4 psig$

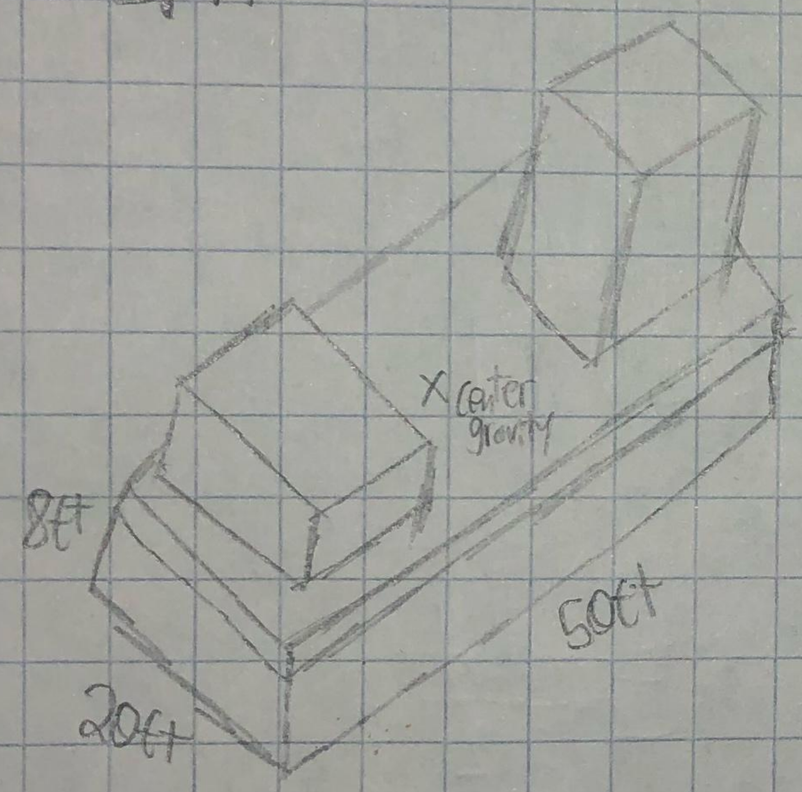
Area of tank $A = \frac{\pi D^2}{4}$

$A = \frac{\pi(30)^2}{4} = 706.858 in^2$

$= (14.4)(706.858)$

$\boxed{F = 10178.7551b}$

5.41



Total weight of the system $W = 450,000 lb$

$H = 8ft$

$B = 20ft$

$L = 50ft$

Submerged volume $V_d = LBH$

$\gamma_{sw} = 64 lb/ft^3$

$V_d = 50(20)x$

$V_d = 1000x$

Buoyancy Force

$F_b = \gamma_f V_d$

$F_b = 64(1000x)$

$F_b = 64,000x lb$

Displaced Distance

$x = \frac{450,000}{64,000} = 7.03ft$

$x = 7.03$

$V_d = (1000)(7.03)$

$F_b = 64,000(x)$

$F_b = 64,000(7.03)$

$F_b = 449,920 lb$

Center of buoyancy

$y_{cb} = \frac{x}{2}$

$= \frac{7.03}{2} = 3.515ft$

$y_{cb} = 3.515ft$

Moment of Inertia

$I = \frac{LB^3}{12}$

$= \frac{(50)(20)^3}{12}$

$= 33.33 \times 10^3 ft^4$

Metacenter

$MB = \frac{I}{V_d}$

$MB = \frac{33.33 \times 10^3}{7030} = 4.742ft$

$4.742 + 3.515 = \boxed{8.257ft \text{ Platform will be stable}}$