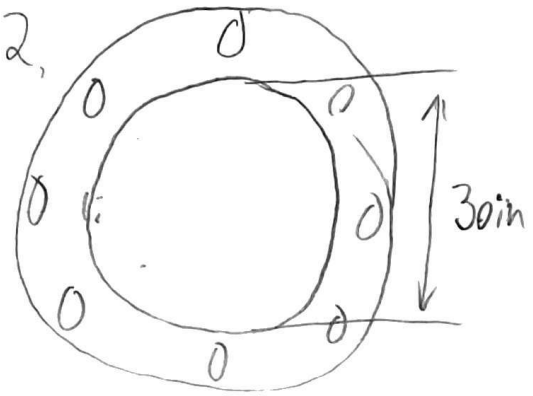
HW3.2

Chapter 4.

2.



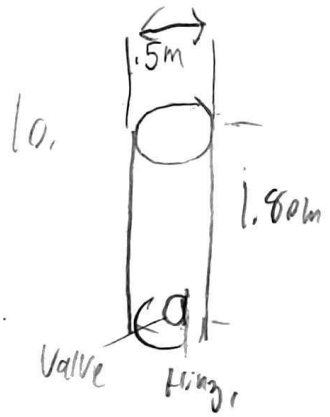
$P = 14.4\ psig$

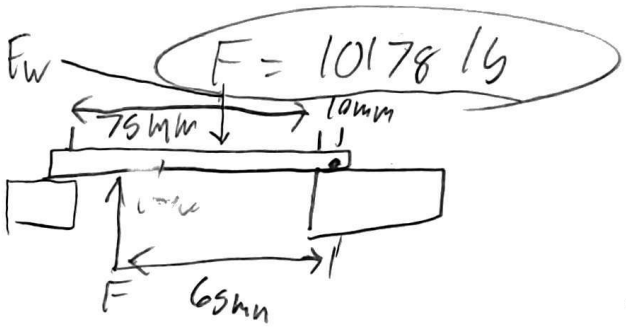
$F = P \times A$

$F = \left(14.4 \frac{lb}{in^2}\right)\left(\frac{\pi}{4} \cdot 30in^2\right)$

$F = 10178\ lb$

10.





Force to open flopper is equal to force of water pushing down

$F = P \cdot A \quad P = \gamma \cdot h$

$P = 9.81 \frac{KN}{m^3} \cdot 1.8m$

$P = 17.658 \frac{KN}{m^2}$

$A = \frac{\pi}{4} \cdot (0.075m)^2$

$A = 0.0044 m^2$

$F_w = 17.658 \frac{KN}{m^2} \cdot 0.0044 m^2$

$F_w = 0.078\ KN$

Force of water is at center of flopper. Force to open is at location 65mm from hinge. Moment of Force water = moment of force to open.

$F \cdot 0.065m = F_w \cdot \left(\frac{.075m}{2} + 0.01m\right)$

$F = \frac{(0.078KN)\left(\frac{0.075m}{2} + 0.01m\right)}{0.065m}$

$F = 0.057\ KN$

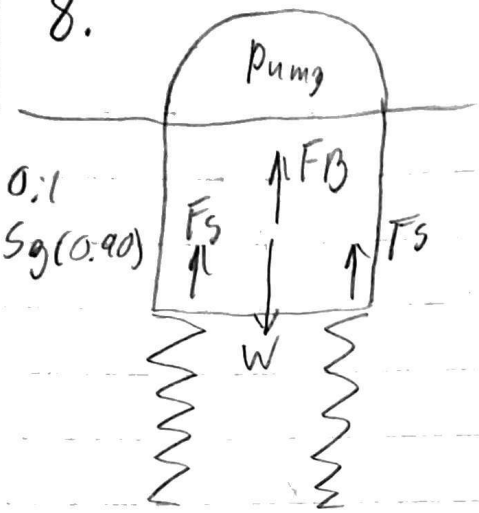
$F = 57\ N$

HW 3.2

Chapter 5

8, 24, 41, 61

8.



$W = 14.6\ lb$

Submerged Volume is $40\ in^3$

$F_{springs}$

$F_B = \gamma_F \cdot V_{Bod}$

$F_{spring} + F_B = W$

$F_{spring} = W - F_B$

$F_B = 0.90 \cdot 62.4\frac{lb}{ft^3} \cdot 40\ in^3 \cdot \frac{1\ ft^3}{1728\ in^3}$

$F_B = 1.3\ lb$

$F_{spring} = 14.6\ lb - 1.3\ lb$

$\boxed{F_{spring} = 13.3\ lb}$

41.

$W = 450{,}000\,lb$

Cg = 8 feet from bottom

- will it be stable?

$$V_d = A \cdot x = b \cdot L \cdot x$$

$$W = F_b$$

$$W = \gamma_{Fluid} \cdot V_d = \gamma_{Fluid} \cdot b \cdot L \cdot x$$

$$x = \frac{W}{\gamma_F \cdot b \cdot L} = \frac{450{,}000\,lb}{62.4\frac{lb}{ft^3} \cdot 20ft \cdot 50ft}$$

$$x = 7.21\,ft$$

$$CB = \frac{x}{2} = \frac{7.21ft}{2} = \boxed{3.61\,ft}$$

$$MB = \frac{I}{V_d} = \frac{\frac{L \cdot b^3}{12}}{b \cdot L \cdot x} = \frac{b^2}{12 \cdot x} = \frac{20^2}{12 \cdot 7.21} = 4.62$$

$$M_C = CB + MB$$

$$= 3.61 + 4.62$$

$$= 8.23\,ft$$

- Location of meta Center is above the Cg which indicates that Ship will be stable