ENGR 207 Assignment 4

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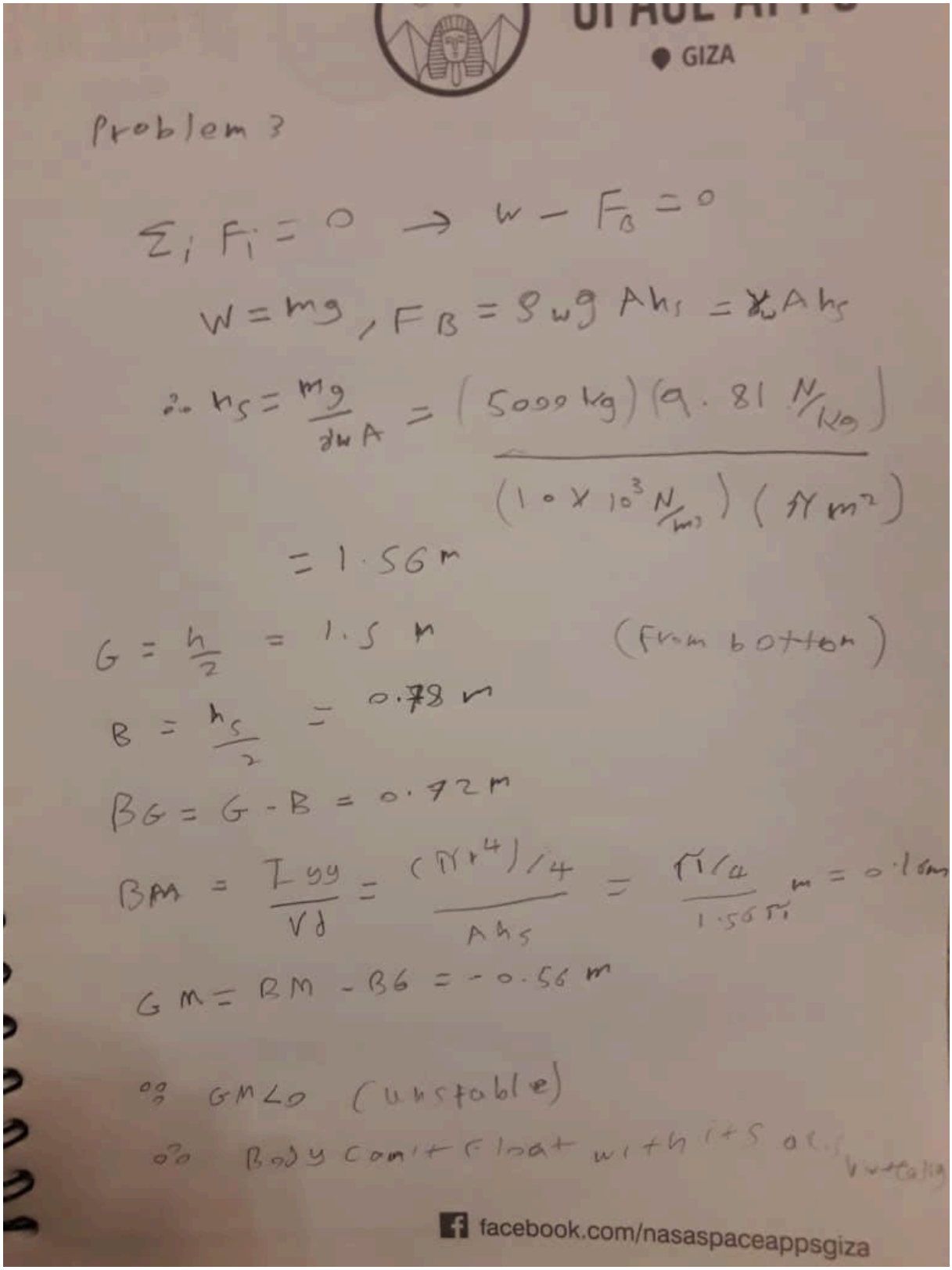
https://colab.research.google.com/drive/1ezvF8vcHIkamR47OBV5YB5OhNk1QCypS?usp=sharing

2 Problem 2

https://docs.google.com/spreadsheets/d/19HIaSu3NSc-8PkMUE-LaAm4NVq5sNAMRlCI7Cq6jzLc/edit?usp=sharing

3 Problem 3


GIZA
Problem 3
$\Sigma_i F_i = 0 \rightarrow W - F_B = 0$
$W = mg$, $F_B = \rho_w g A h_s = \gamma_w A h_s$
$\therefore h_s = \frac{mg}{\gamma_w A} = \frac{(5000\ kg)(9.81\ N/kg)}{(1.0 \times 10^3\ N/m^3)(1\ m^2)}$
$= 1.56\ m$
$G = \frac{h}{2} = 1.5\ m$ (From bottom)
$B = \frac{h_s}{2} = 0.78\ m$
$BG = G - B = 0.72\ m$
$BM = \frac{I_{yy}}{Vd} = \frac{(\pi r^4)/4}{A h_s} = \frac{\pi r^4}{1.56\pi r^2}\ m = 0.16m$
$GM = BM - BG = -0.56\ m$
$\therefore GM < 0$ (unstable)
$\therefore$ Body can't float with its axis vertically
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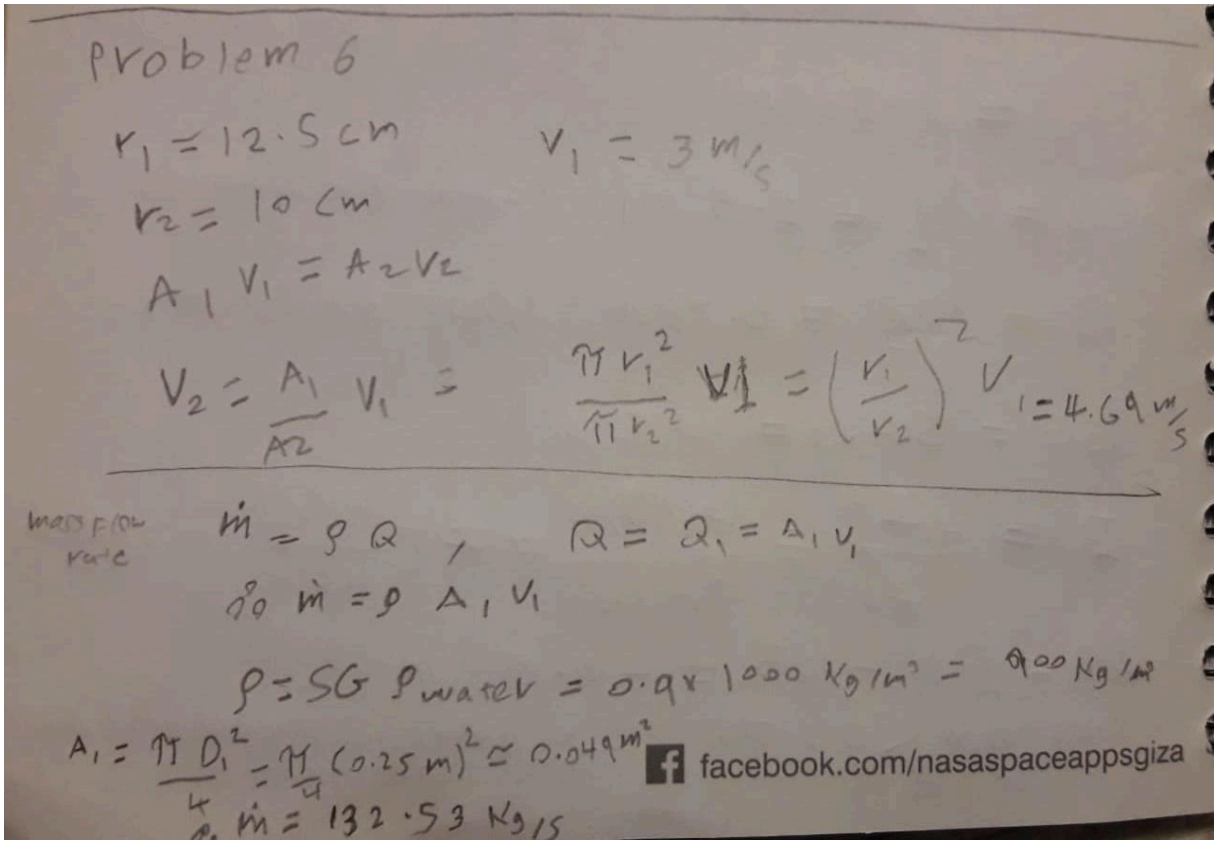
4 Problem 4

https://colab.research.google.com/drive/1ezvF8vcHIkamR47OBV5YB5OhNk1QCypS?usp=sharing

5 Problem 5

https://docs.google.com/spreadsheets/d/19HIaSu3NSc-8PkMUE-LaAm4NVq5sNAMRlCI7Cq6jzLc/edit?usp=sharing

6 Problem 6


Problem 6
$r_1 = 12.5\ cm$
$V_1 = 3\ m/s$
$r_2 = 10\ cm$
$A_1 V_1 = A_2 V_2$
$V_2 = \frac{A_1}{A_2} V_1 = \frac{\pi r_1^2}{\pi r_2^2} V_1 = \left(\frac{r_1}{r_2}\right)^2 V_1 = 4.69\ m/s$
mass flow rate
$\dot{m} = \rho Q$, $Q = Q_1 = A_1 V_1$
$\therefore \dot{m} = \rho A_1 V_1$
$\rho = SG\ \rho_{water} = 0.9 \times 1000\ kg/m^3 = 900\ kg/m^3$
$A_1 = \frac{\pi D_1^2}{4} = \frac{\pi}{4}(0.25\ m)^2 \simeq 0.049\ m^2$
$\dot{m} = 132.53\ kg/s$
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