ENGR 207 Assignment 5

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Contents

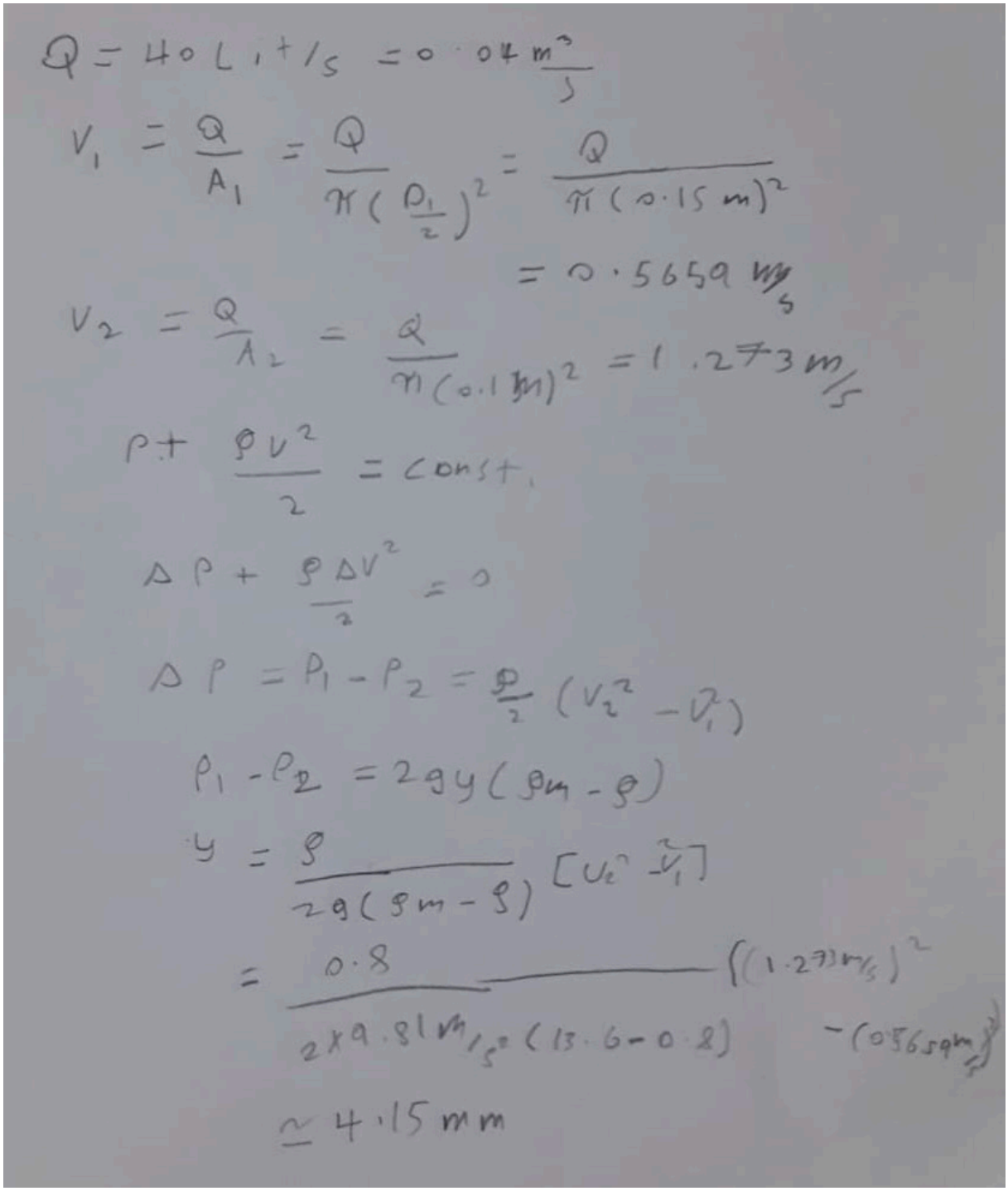
1 Problem 1

https://docs.google.com/spreadsheets/d/1CzIPJ5D-QBWlSUav1pO0Eagw1V6teXcCctc4o4u9bNA/edit?usp=sharing

2 Problem 2

https://colab.research.google.com/drive/1tJ9nPd0Ms2XQzqH3ap3Lk13XZ3JCr2qA?usp=sharing

3 Problem 3


Q = 40 Lit/s = 0.04 m³/s
V1 = Q/A1 = Q/π(D1/2)² = Q/π(0.15 m)²
= 0.5659 m/s
V2 = Q/A2 = Q/π(0.1 m)² = 1.273 m/s
P + ρV²/2 = Const.
ΔP + ρΔV²/2 = 0
ΔP = P1 − P2 = ρ/2 (V2² − V1²)
P1 − P2 = 2gy(ρm − ρ)
y = ρ / 2g(ρm − ρ) [V2² − V1²]
= 0.8 / (2×9.81 m/s²(13.6 − 0.8)) ((1.273 m/s)² − (0.5659 m/s)²)
≃ 4.15 mm

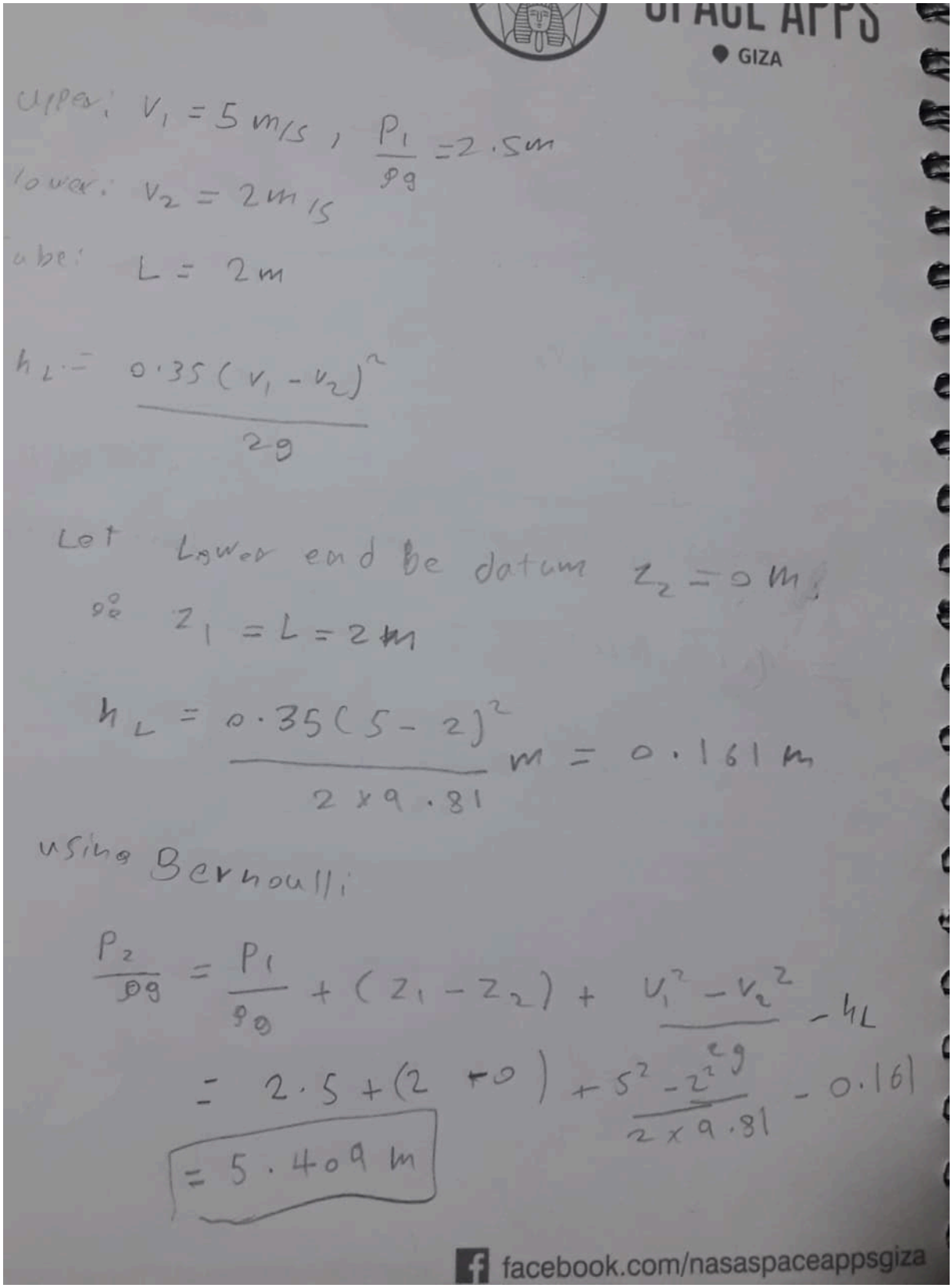
4 Problem 4

https://docs.google.com/spreadsheets/d/1CzIPJ5D-QBWlSUav1pO0Eagw1V6teXcCctc4o4u9bNA/edit?usp=sharing

5 Problem 5

https://colab.research.google.com/drive/1tJ9nPd0Ms2XQzqH3ap3Lk13XZ3JCr2qA?usp=sharing

6 Problem 6


GIZA
Upper: $V_1 = 5\ m/s$, $\frac{P_1}{\rho g} = 2.5m$
lower: $V_2 = 2\ m/s$
ube: $L = 2m$
$h_L = \frac{0.35(V_1 - V_2)^2}{2g}$
Let Lower end be datum $z_2 = 0\ m$;
so $z_1 = L = 2m$
$h_L = \frac{0.35(5-2)^2}{2 \times 9.81} m = 0.161\ m$
using Bernoulli:
$\frac{P_2}{\rho g} = \frac{P_1}{\rho g} + (z_1 - z_2) + \frac{V_1^2 - V_2^2}{2g} - h_L$
$= 2.5 + (2 + 0) + \frac{5^2 - 2^2}{2 \times 9.81} - 0.161$
$= 5.409\ m$
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