University of Colorado Denver
Department of Civil Engineering
CVEN-3313 Fluid Mechanics

HOMEWORK ANSWERS
dcm ~~9/18/2024~~9/30/2024

Answers to Homework Problems
These partial answers will help determine whether you are on track. Some have been rounded.

Week 1
(1) The rounded result of 9812/1000 is 10 and has 1 significant figure, (3c) 10 m^3, (4) 7.0 psi, (5c) 2.9 psi, (6b) A = 54 in^2

Week 2
(1) 15 mm, (3) 6 x 10^{-5} ft^2/s, (4b) 320 N, (5) μ = 368 Ns/m^2, (6a) P_{max} = 846 lb/ft^2, (8b) 13.7 psi

Week 3
(2) F = 6.1 x 10^5 N, (3a) 920 lb, (4) 590 kN, (5) 430 N

Week 4
(1a) 42 kg, (2a) 25,000 lb, (3) 170 tons*, (4d) 2300 lb, (5) 4032 m^3, (6) 15 ft^3

Week 5
(4a) Re = 400, (5a) 40-44 cfs, (5b) 2.7 ft/s

Week 6
(1c) 60 minutes, (2a) The mass flow rate at duct 1 is 0.144 kg/s, (3) 1.1 kg/min, (4d) 0.13 m/s, (6b) Total head = 28 m

Week 7
(1) 1.1 psi, (2) 0.69 m/s, (3) V_A = 14 m/s, ~~(4) 6.26 m/s, (6) 92 ft~~
~~(8) P/γ = 0; z = 270 m; HGL = 270 m~~ (4) EGL drops and HGL rises at junction, (5) velocity head increases and pressure head decreases, (6) results will vary.

Week 8
(1) 320 hp, (2a) 1.7 x 10^5 W, (3a) 40 hp, (4b) 19%, (6) 13 m/s, (7) V > 14 m/s

Week 9
(2d) 430 lb, (3) 0.43 lb, (4) F = 52 lb, (5) 31 mph

Week 10
3 At point D, the HGL is – 3 ft.
4 At point F, the HGL is 8 ft.

Week 11
(1) 390 ft

* Could be 180 tons depending on scaling vertical projection from diagram. Answer in two significant figures.

Week 12
(1) short response, (2) short response, (3d) 86%, (4) 87 ft/s, (5c) D = 0.16 mm

Week 13
(1a) 8 m/s, (2) Q = 0.0063 cfs, (3) 1.05 m, (4c) D = 1.0 mm, (5) There are 3 Π groups

Week 14
(3b) V = 2.3 m/s, (4a) R_h = 0.75 ft, (5b) Option 1, $680K/year; Option 2, $2.4M/year; Option 3, $470K/year