The University of Melbourne
ENGR30002 Fluid Mechanics

Workshop 09 – *Pipe flow (Branches)*

Part A: Entering a numerical input and storing the input

Input   Use the line num = input('`Enter a numerical input:`   ') to prompt the user for a numerical input and store the input in a variable num.

randi(imax)   `Randi` is a MATLAB built function that uniformly distribute pseudorandom integers. It returns a scalar integer between 1 and imax.

Question 01

Write a function **guess my number** that randomly picks a "lucky number", an integer between 1 and 20, and then keeps prompting the user to input a number until they guess the correct lucky number and then exits. If a 0 is entered the program should exit immediately.

Question 02

Modify the function in Question 1 to display a message if the number guessed is correct or not.

Part B

Question 01

The three water-filled tanks are located as shown in Figure 1 and are connected by pipes. If the fluid flows from A to B and A to C, what are flow rates in each pipe? Neglect minor losses.
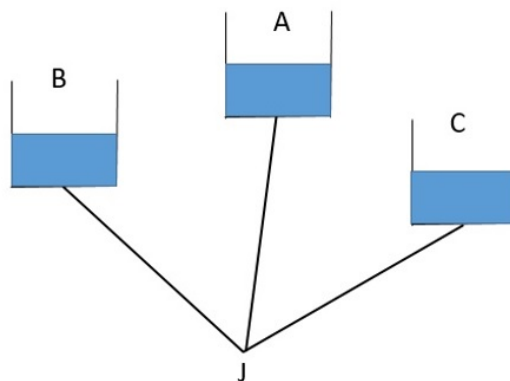

Figure 1: Piping system

Table 1: Physical data for Question 01

Tank	A	B	C
D (m)	0.10	0.08	0.08
L (m)	200	200	400
Z (m)	60	20	0
f	0.015	0.020	0.020

Question 02

The three water-filled tanks are located as shown in Figure 2 and are connected by pipes. If the fluid flows from both A and B to J, and J to C, what are flow rates in each pipe? Neglect minor losses.
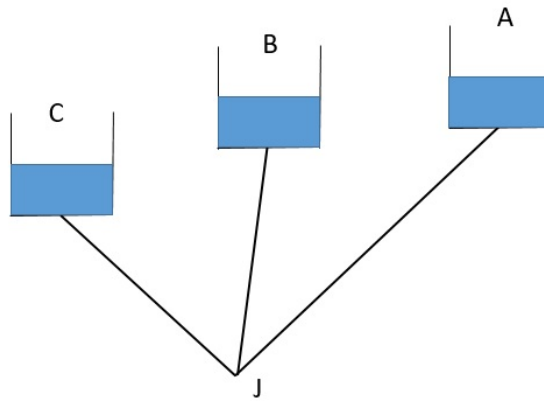

Figure 2: Piping system

Table 2: Physical data for Question 02

Tank	A	B	C
D (m)	0.66	0.66	1
L (m)	2000	1000	2000
Z (m)	100	80	50
ϵ (m)	0.004	0.004	0.04

(1) Write MEBs for A to J, B to J, and C to J in terms of a hydraulic grade line of the junction and head loss.

(2) To determine flow rates, you will guess friction factors and HGL based on given information. Find expressions of velocities in each pipe.

(3) With what you find in the previous steps, you will write code to take one input of guessed HGL. You need to save guessed friction factors as *guessed f.mat* and call these values for your iteration until your guessed HGL converges. Set a tolerance of 10^{-2}.

Bonus question Once you find a converged HGL, you need to compare friction factors with your guessed friction factors. If they are different, you will use the new friction factors and repeat the iteration until friction the factors converge. What are your final friction factors?

END OF WORKSHOP