COE-C2003 Basic course on fluid mechanics, S2021

Round 2: The Bernoulli equation (return at the latest by Thu 30.9. at 13:00 o'clock)

Each problem (1-4) will be assessed on a scale of 0-3. Remember to explain the different stages in the solution. More detailed information can be found from MyCourses.

1. Briefly explain the following concepts. You may also add a figure (no copies from the book or from the lecture notes) to clarify the concept.
    a. Streamline, what does it mean ?
    b. Streakline ?
    c. Pathline ?

2. Air is drawn into a wind tunnel used for testing automobiles as shown in Fig. 1. (a) Determine the manometer reading, h, when the velocity in the test section is 100 km/h. Note that there is a 2.5cm column of oil (SG=0.90) on the water in the manometer. (b) Determine the difference between the stagnation pressure on the front of the automobile and the pressure in the test section.
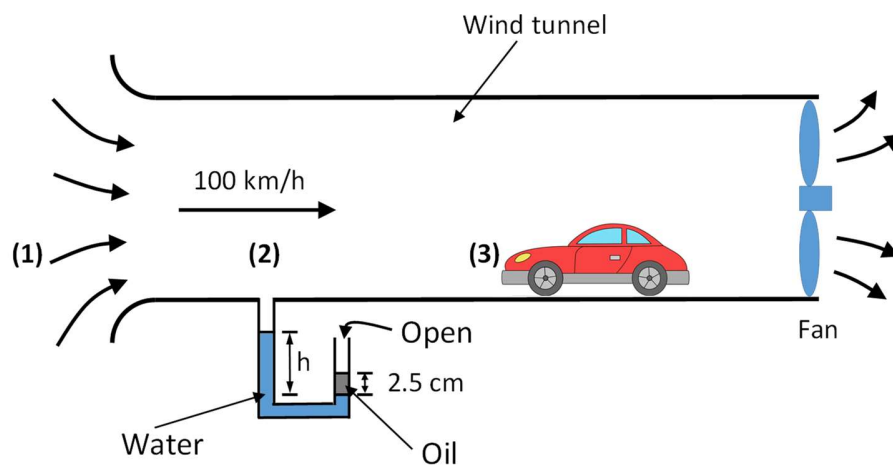

Figure 1. Problem 2.

3. A fire hose nozzle has a diameter of 3 cm. According to some fire codes, the nozzle must be capable of delivering at least 750 liters/min. If the nozzle is attached to a 7.5 cm diameter hose, what pressure must be maintained just upstream of the nozzle to deliver this flowrate ?
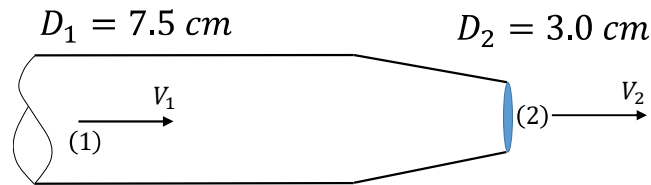
$$D_1 = 7.5\ cm \qquad D_2 = 3.0\ cm$$

V_1
(1)

V_2
(2)

Figure 2. Problem 3

4. Plot some curves with Matlab (plot-command). Plot the equation $y^2 = C\ kx$ with Matlab using values for k as $k=0$, $k=1$ ja $k=2$. C is a constant and it is defined according to your student number's last digit (if it is zero, then C=10). Define x between 0-20, in 0.25 steps. Plot only positive y-values. Plot all the three curves to the same figure (hold on -command). In the answer, there should be both the code and the figure.

It is recommended to again start by creating a new script (top menu, left, New -> script). You can save the figure e.g. in png as follows "saveas(fig1,'Round2','png'); " (Define first fig1=figure(1)). Saving in pdf can be done by just using 'pdf' instead of 'png'.