Physics Quiz – Chapter 13: Fluids – Winter 2026 – Monadi – CP SLO

Full Name:_____

$$1/2\rho v_1^2 + \rho g y_1 + P_1 = 1/2\rho v_2^2 + \rho g y_2 + P_2 = Constant$$

$$P = P_0 + \rho g h$$

$$\rho = m/V$$

$$Q = A_1 v_1 = A_2 v_2$$

Note: Please show your complete work, write organized and clearly, draw a diagram, explain your reasoning, and write an equation before plugging in numbers for the full credit. A simple calculator is allowed. ☺

Problem: (20 points)

A horizontal water pipe narrows from a diameter of 2 m to a diameter of 1 m. The speed of water flow is 3 m/s in the wider section. At each section of the pipe, a vertical tube open to the atmosphere is attached, forming two water columns that indicate the local pressure. The height of the water column above the narrower section is 10 m, Assume steady, incompressible, non-viscous flow. Air pressure is $100.0kPa$. Water density is $1000kg/m^3$. $g = 10m/s^2$ and $\pi = 3.14$

(a) **(4 points)** Find the velocity of water in the narrower section.

(b) **(4 points)** What is the pressure of water in the narrower section?

(c) **(4 points)** What is the pressure of water in the wider section?

(d) **(4 points)** Calculate the height of water column in the wider section.

(e) **(4 points)** Explain how the height of water columns would have changed, if the there was a less input water volume rate into the pipe.