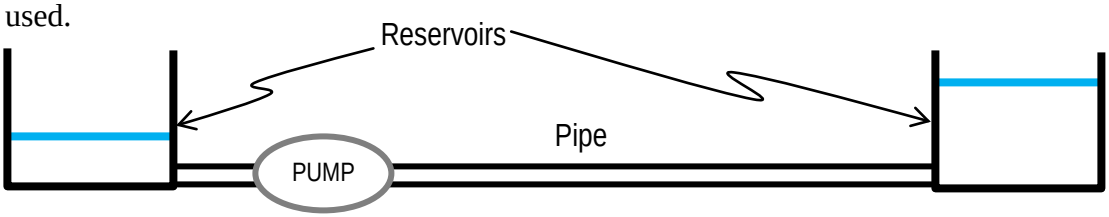
Name: _____

CVEN 311-501 – "Fluid Dynamics"
Quiz #5 – Fall 2010
Prof. Brumbelow
November 22, 2010

In order to determine the effectiveness of a new pump design, the experimental setup sketched below will be used.



It is hypothesized that the velocity of flow in the pipe V (ft/sec) can be determined by the following function:

$$V = f\left(D, \varepsilon, \mu, \rho, \Delta z, \dot{W}\right)$$

where D = pipe diameter (ft), ε = pipe roughness height (ft), μ = fluid viscosity (lb·sec/ft^2), ρ = fluid density (slugs/ft^3), Δz = difference in elevation between the starting and ending reservoirs (ft), and $\dot{W}$ = power input to the pump (ft·lb/sec). Use the Buckingham Pi theorem to determine an appropriate function of dimensionless ratios $\left(\text{i.e., of the form}: \Pi_1 = \phi\left(\Pi_2, \Pi_3, ...\right)\right)$ that may be used to analyze the experimental data.