Survey of Engineering Name_____
Civil Engineering Unit
2.5i Fluid Mechanics Exercises Date_____ Period_____

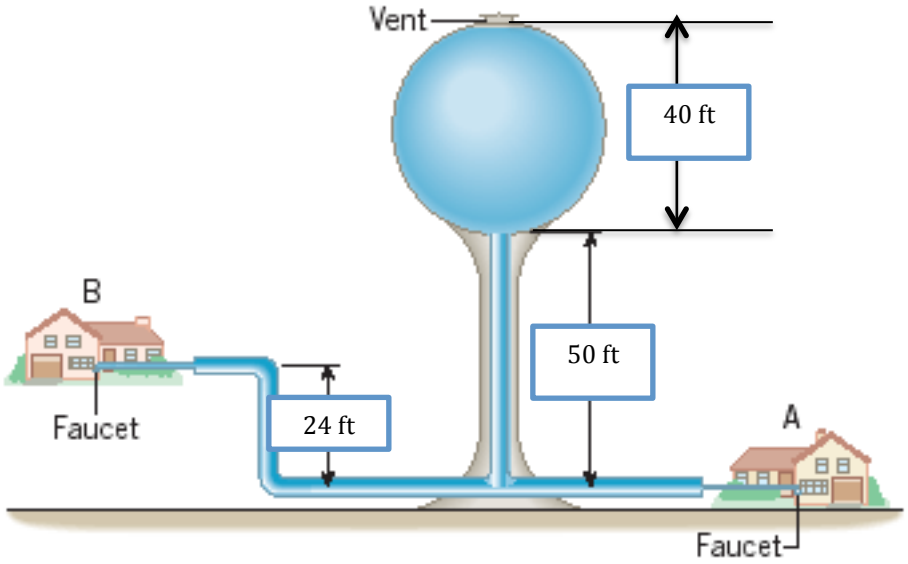

Figure 1

For Problems 1 – 3, refer to Figure 1. Report all answers in psig and psia.

1. If the water tower tank is full, calculate the pressure at the faucet at House A.

2. If the water tower tank is full, calculate the pressure at the faucet at House B.

3. If the tank begins to re-fill when the level reaches 30 ft below the vent, what is the minimum water pressure that can be expected at House A? At House B?

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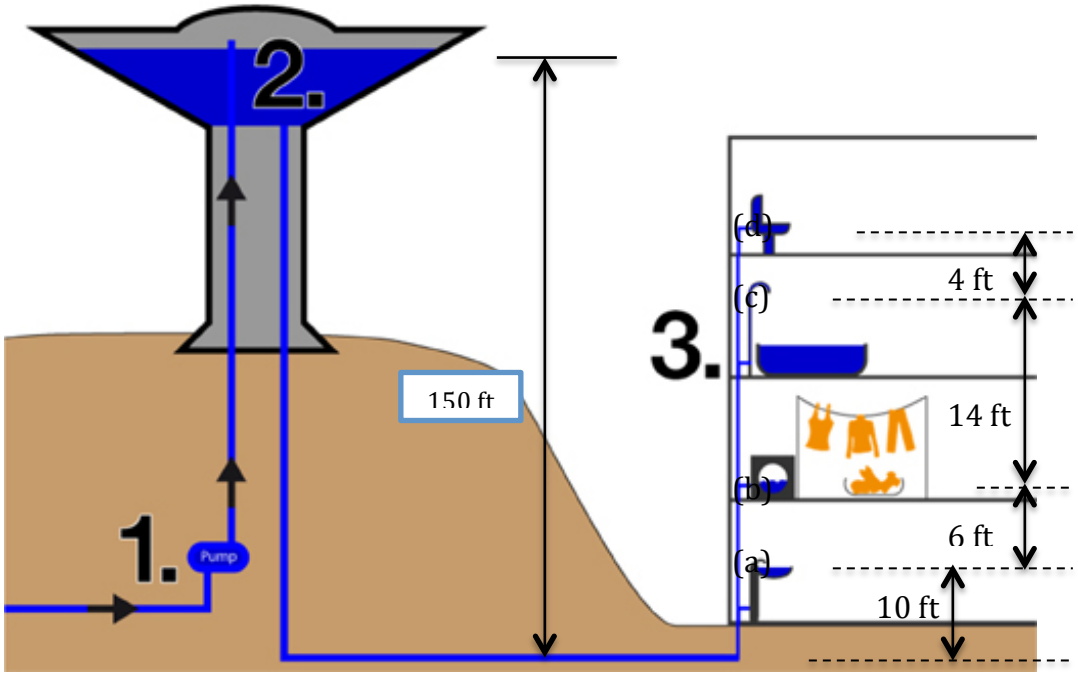

Figure 2

Refer to Figure 2 for Problems 4 and 5. Also, assume there is no friction loss in the piping.

4. Assume all taps are closed. If you open only the tap at (a), what would be the velocity of the water coming out? Repeat calculation for taps (b), (c), and (d).

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5. If a ½ inch diameter pipe supplies all fixtures, calculate the volumetric flow rate that could be expected at each tap based on the velocity you calculated in Problem 4. (Volumetric flow rate = Q = A*v) Report answers in units of gal/s.

6. What are the two purposes that a water tower serves?

Useful numbers and relationships:

$\Delta P = \rho g h$

$v = \sqrt{2gh}$

ρ = fluid density = 1.94 slugs/ft^3 for H_2O at 32 °F.

1 slug = 1 lb_f/(1 ft/s^2)

g = 32.17 ft/s^2

1 ft^2 = 144 in^2

1 gal = 0.13368 ft^3

Gauge pressure is the pressure relative to atmospheric pressure and may be positive or negative. It is often expressed in units of **psig**.

Absolute pressure is relative to a perfect vacuum and is always positive. It is often expressed in units of **psia**.

$P_{absolute} = P_{gauge} + P_{atm}$

P_{atm} = 14.7 psia at sea level (standard barometric pressure).