Name: Due Date

Assignment 1.03: Fluid Continuity

1. Water flows in a pipe of radius 2 cm at a speed of 1 m/s. The water then enters a thinner pipe, with a radius of 1 cm. What is the speed of the water in the thinner pipe?

2. A water tank springs a leak in the bottom, and water begins to flow out of a 1-cm radius hole at a speed of 17 m/s. If the tower has a radius of 4 meters, speed that the water level drops?

3. A fuel line in a car has a radius of 0.635 cm. The gasoline flows to a fuel injector that has an opening of 0.00045 cm in radius. If the fuel travels at 0.004 m/s in the fuel line, how fast does it come out of the injector opening?

4. Water flows at a speed of 3 m/s in a hose of radius 1 cm. You want the water to go farther, so you place your thumb over the end of the hose. If the water comes out at 15 m/s, what is the effective radius of the hole where the water comes out? (Assume the hole is circular)

5. A sprinkler system has 6 sprinklers connected to a 1.27cm radius pipe. Each sprinkler has a 2mm opening from which water sprays. If the speed of the water coming out of the opening is 15m/s, what is the speed of the water in the pipe?

6. A water line with an internal radius of 6.5 10^{-3} m is connected to a shower head that has 12 holes. The speed of the water in the line is 1.2 m/s. At what speed does the water leave one of the holes (effective hole radius = 4.6 10^{-4} m) in the shower head?

7. Water is exiting a garden hose (r=1.25 cm) at a speed of 2 m/s. The garden hose is held horizontally, at a height of 4.9 meters above the ground.

   (a) Calculate the time it takes for the water to fall to the ground.

   (b) You wish to water a plant that is 7 meters away from the hose (horizontally).

   (c) What is the speed the water would need to fall at the base of the plant?

   (d) You put your thumb over the hose to cause the water to travel faster. What radius should the exit-hole of the hose be in order for the water to reach the plant? (Assume the exit-hole is circular).