Q1 A diffusion furnace of 12 ft³ capacity contains air at 14.7 psi. The vacuum pump that attached to the furnace is pumping out air 25°C at the rate of 27000 cc/min. How long will it take to reduce the system pressure from 14.7 psi to 0.0147 psi?

Q2 Gasoline is being pumped out at a rate of 8 gal/min. The dispensing nozzle diameter is 0.9 inch. Calculate the mass flow rate and average velocity assuming the gasoline density of 0.7 g/cc.

Q3 The tank as shown in the following figure has an inflow line with a cross-sectional area of 0.5 ft² and an outflow line with a cross-sectional area of 0.3 ft². Water is flowing in the inflow line at a velocity of 12 ft/s, and gasoline is flowing out the outflow line at a velocity of 10 ft/s. How many lbm/s of air are flowing through the vent? Which way?