1. Air is flowing out of a duct at a velocity of 250m/s with a temperature of 0^0C and a pressure of 70 kPa. A valve at the end of the duct is suddenly closed. Find the pressure acting on the valve immediately after the valve closure.

2. In a Shock tube (driver gas- Helium and driven gas- Air) after the diaphragm ruptures,the shock moves into the driven section with a Mach number of 3. Pressure and temperature of driven gas are 1 atm. and 300 K resp., Pressure and temperature of driver gas 4420 kPa and 300K. Calculate the driver gas temperature after the diaphragm ruptures. Assuming the driven section is open and driver section is very long, calculate the time for the tail of expansion waves from the driver section to reach the open end of the driven section.
   Length of the driven section = 1m.

3. To achieve the tailored condition, in which the reflected shock passes through the contact surface unaltered, what should be the velocity of the shock wave.
   (Driver gas: helium, driven gas: air,$T_4 = T_1 = 300$ K, $P_1 = 1$ atm)