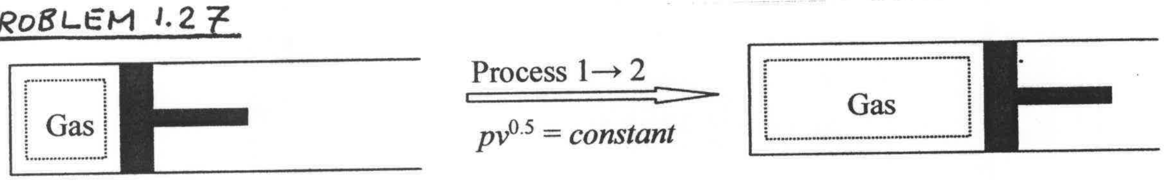
PROBLEM 1.27



$m = 3$ kg
$p_1 = 250$ kPa
$V_1 = 1.5$ m^3

$p_2 = 100$ kPa

The final specific volume, v_2, can be determined from

$$p_1 v_1^{0.5} = p_2 v_2^{0.5}$$

Solving for v_2 yields

$$v_2 = v_1 \left(\frac{p_1}{p_2}\right)^{\frac{1}{0.5}}$$

Specific volume at the initial state, v_1, can be determined by dividing the volume at the initial state, V_1, by the mass, m, of the system

$$v_1 = \frac{V_1}{m} = \frac{1.5\ \text{m}^3}{3\ \text{kg}} = 0.5\ \text{m}^3/\text{kg}$$

Substituting values for pressures and specific volume yields

$$v_2 = \left(0.5\frac{\text{m}^3}{\text{kg}}\right)\left(\frac{250\ \text{kPa}}{100\ \text{kPa}}\right)^{\frac{1}{0.5}} = \underline{\mathbf{3.125\ m^3/kg}}$$

The volume of the system increased while pressure decreased during the process.

A plot of the process on a pressure versus specific volume graph is as follows: