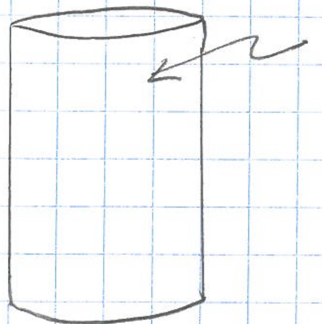

$M = 5g$ of N_2

$P_1 = 3atm = 3.039 \times 10^5\ Pa$

$T_1 = 20°C = 293\ K$

Number of moles $n = \frac{M(\text{in } g)}{M_{mol}}$

$(M_{mol})_{N_2} = 28\ g/mole$

So $n = \frac{5g}{28\ g/mole} = 0.1786\ mol$

Now: at ①

$PV = nRT \Rightarrow V_1 = \frac{nRT_1}{P_1} = 1.431 \times 10^{-3}\ m^3$

$= 1431\ cm^3$

a.) Isobaric Exp. to $V_2 = 3V_1 = \underline{4293\ cm^3}$
$(P_2 = P_1)$

b.) ① → ② $PV = nRT \Rightarrow \frac{P}{nR} = \frac{T}{V} = const.$

$\frac{T_1}{V_1} = \frac{T_2}{V_2} \Rightarrow T_2 = T_1\left(\frac{V_2}{V_1}\right) = 3T_1 = \underline{879\ K}$

c.) ② → ③ Constant Volume to $T_3 = T_1$
$(V_3 = V_2)$

$PV = nRT \Rightarrow \frac{V}{nR} = \frac{T}{P} = const.$

$\frac{T_3}{P_3} = \frac{T_2}{P_2} \Rightarrow P_3 = P_2\left(\frac{T_3}{T_2}\right) = P_2\left(\frac{1}{3}\right) = \underline{1\ atm}$

d.) (3) → (4) Isothermal Compression to

$$V_4 = V_1 = 1.431 \times 10^{-3}\ m^3$$

$$PV = nRT = const. \Rightarrow P_3 V_3 = P_4 V_4$$

So: $P_4 = P_3 \left(\frac{V_3}{V_4}\right) = P_3 \left(\frac{3V_1}{V_1}\right) = \underline{3\ atm}$

e.)