Physics 161 Fall 2017 HW solutions 3.

19.28 $pV = nRT$ $\quad T = \frac{pV}{nR}$. $\quad V_i = 3.2\times10^{-2}\ m^3 = 32\ L$. $\quad V_f = 45\ L$.

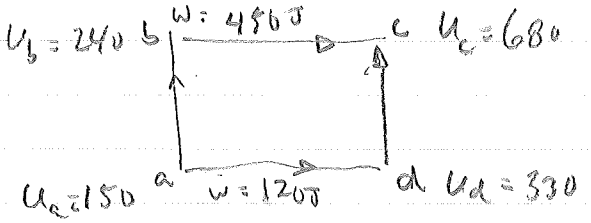
a) $T_i = \frac{2.5\ atm \cdot 32\ L}{3 \cdot 0.082 \frac{L\,atm}{mol\,K}} = 325\ K$ $\quad T_f = 456\ K$.

b) $W = \int p\,dV = p\Delta V = 2.5\ atm \cdot (45-32)\ L = 32.5\ L\cdot atm = 3290\ J$.

c) $Q = nC_p\Delta T = 3\cdot\frac{5}{2}R\cdot(456-325\ K) = 8170\ J$.

d) $\Delta U = Q - W = 4880\ J$.

19.44.

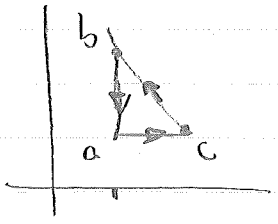


$Q_{ab} = \Delta U \quad (W_{ab}=0) = 90\ J$ $\quad Q_{dc} = \Delta U = +350\ J$.

$Q_{bc} = \Delta U + W = 890\ J$. $\quad Q_{ad} = \Delta U + W = 300\ J$.

Heat is absorbed by gas in all processes

19.48



$T_a = 300K$ $\quad n = 3$.

$T_c = 492\ K$

$T_b = 600K$.

$W_{ac} = p_A(V_c - V_a) = nR(T_c - T_A) = 4780\ J$.

$-W_{cb} = \Delta U$, since $Q_{cb} = 0$. $\quad \Delta U = nC_V\Delta T = n(C_p - R)\Delta T = 6735\ J$

$W_{ab} = 0$. $\quad W_{ca} = 4780 - 6735 = -1950\ J$.