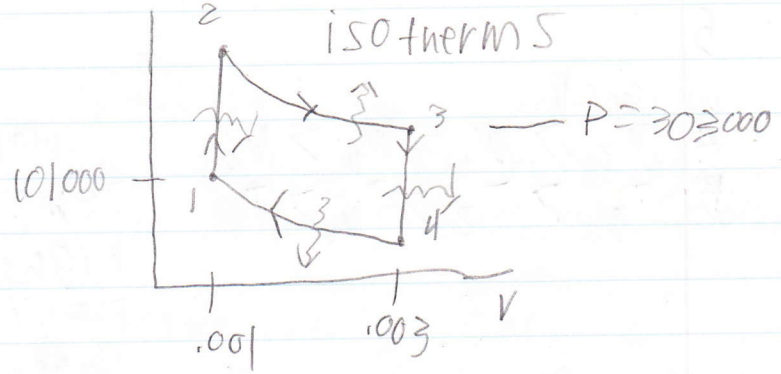
Exam

4

A $\eta_{carnot} = 88.9\%$

$\eta_{engine} = 25.9\%$

$1 - \frac{Q_C}{Q_H} = 1 - \frac{2535}{3423} = .259$



$Q_C = Q_{34} + Q_{41}$

$C_V = 3R$

$Q_{34} = n C_V \Delta T = 3 V_3 (P_4 - P_3)$

$T_H = T_3 = \frac{P_3 V_3}{nR}$

$P_1 V_1 = P_4 V_4$

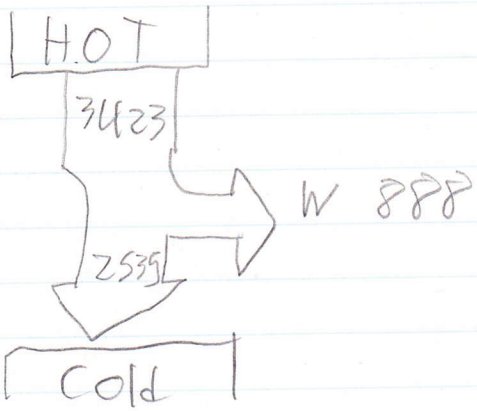
$T_C = T_1 = \frac{P_1 V_1}{nR}$

$P_4 = \frac{P_1 V_1}{V_4} = 33,667$

$\eta_{carnot} = 1 - \frac{P_1 V_1}{P_3 V_3} = .889$

$Q_{34} = -2424$

$Q_{41} = P_1 V_1 \ln\left(\frac{V_1}{V_4}\right) = 411$



$Q_C = 2535$

$Q_H = Q_{12} + Q_{23} = 3423$

$Q_{12} = 3V_1 (P_2 - P_1)$

$P_2 V_2 = P_3 V_3$

$P_2 = P_3 V_3 / V_2 = 90900$

$Q_{12} = 2424$

$Q_{23} = P_3 V_3 \ln\left(\frac{V_3}{V_2}\right) = 999$