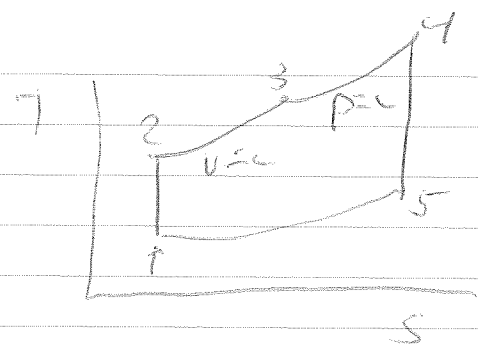
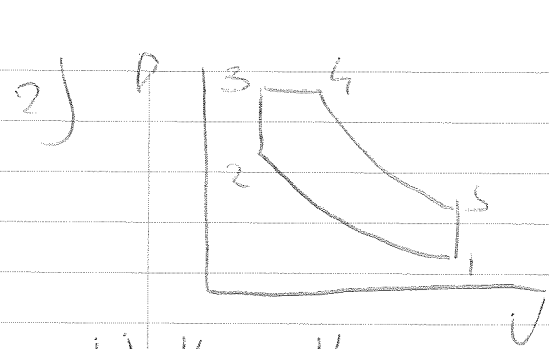


naam name	BOERSMA	
studienummer student number		
vak course		
code code	datum date	
opleiding program		
aantal ingeleverde vellen total number of sheets	opgave nummer question number	



b)  $\frac{V_2}{V_1} = \frac{V_{32}}{V_{41}} \quad V_{32} = V_{41} / 10 = 621.2 / 10 = 62.12$   
 $T_2 = 730 \text{ K}$   
 $\left(\frac{T_1}{T_2}\right) = \left(\frac{V_1}{V_2}\right)^{\gamma-1} \quad \gamma = \frac{c_p}{c_v} = 1.4$   
 $T_2 = 300 \cdot 10^{0.4} = 754 \text{ K}$

c)  $T_3 = \frac{P_3}{P_2} T_2 = 1500 \text{ K} \quad T_4 = \frac{V_4}{V_3} T_3 = 2262 \text{ K}$   
 $\left(\frac{T_4}{T_5}\right) = \left(\frac{V_4}{V_5}\right)^{\gamma-1} = \left(\frac{V_4}{V_3} \frac{V_3}{V_5}\right)^{\gamma-1} = \left(\frac{V_4}{V_3} \frac{V_2}{V_1}\right)^{\gamma-1} = \left(\frac{1.5}{10}\right)^{0.4}$   
 $T_5 = 1059 \text{ K}$

d)  $Q_{23}/m = c_v (T_3 - T_2) = 538 \text{ kJ/kg}$   
 $Q_{34}/m = c_p (T_4 - T_3) = 754 \text{ kJ/kg}$   
 $Q_{51}/m = c_v (T_1 - T_5) = -542 \text{ kJ/kg}$

e)  $W = Q_{in} - Q_{out} = 750 \text{ kJ/kg}$   
 $\eta = 750 / (538 + 754) = 58\%$

f)  $P = \frac{W}{60} \quad W = 1 \text{ kJ} = m = \frac{1}{750} = 1.33 \cdot 10^{-3} \text{ kg}$   
 $V_1 = \frac{nRT}{P_1} = \frac{1.33 \cdot 10^{-3} \cdot 8314 \cdot 300}{29} = 1.14 \text{ liter}$   
 versterkt dus  $10^5$  dus  $2.28 \text{ liter}$