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Professor Ayala

MET 350

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Test 1

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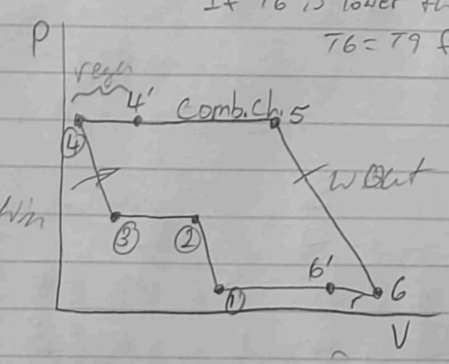
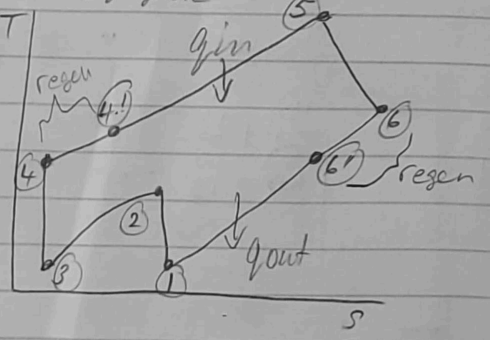
1) - Air enters gas turbine w. 2 stages of comp. & 2 stages of expansion.
- $T = 17°C$, $P = 100\ kPa$ @ air inlet
- $r_p = 4$
- $300\ ^{kJ}/_{kg}$ at each combustion chamber
- no reheater!
- C_p & C_v constant $C_p = 1.005\ ^{kJ}/_{kg \cdot K}$, $C_v = .7186\ ^{kJ}/_{kg \cdot K}$

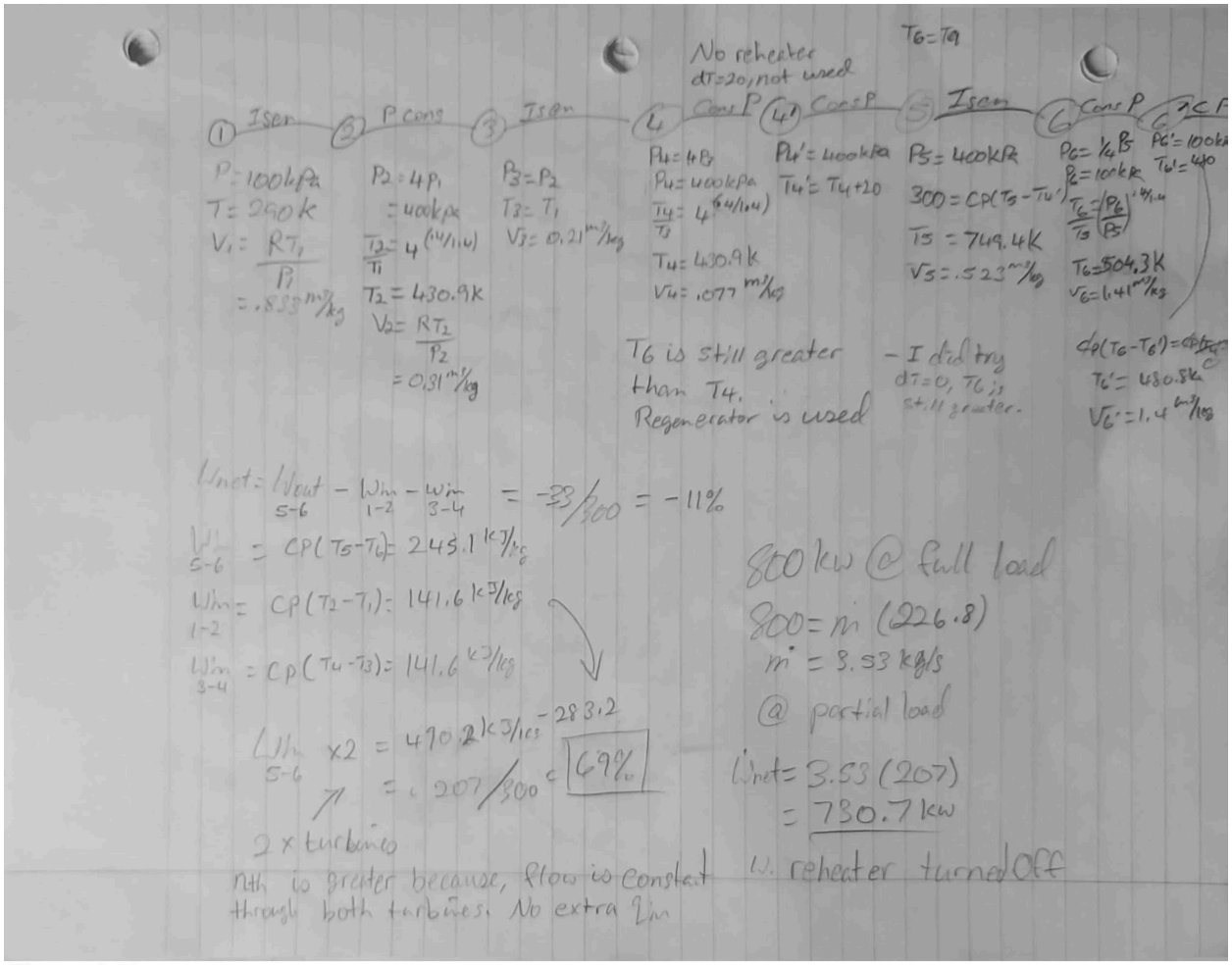
$k = 1.4$

If T_6 is lower than T_4, regen is negligible

$T_6 = T_9$ from original T







2) Pure jet engine

- Vaircraft = 240 m/s
- $P_1 = 45 kPa$, $T_1 = 260.15 K$
- D engine inlet = 1.6m
- $\Pi P = 13$
- T inlet turbine = 557°C = 830.15K
- $\eta_C = .80$ $\eta_T = .85$

Variable: C_p, C_v

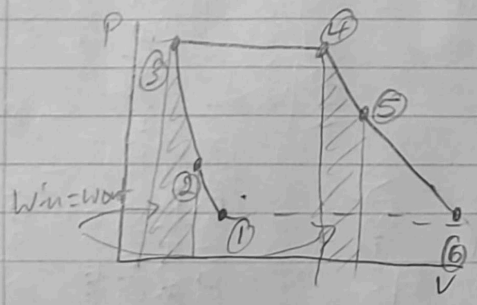
@ 260.15K $C_p = 1.003$

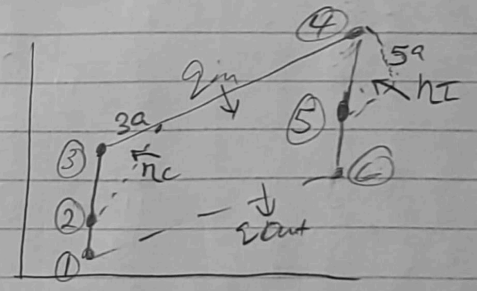
$C_v = .716$

$k = 1.401$

η_{prop}? compare to origina on 9-142

$$\eta_P = \frac{\dot{W}_P}{\dot{Q}_{in}}$$





$$\eta_C = \frac{h_3 - h_2}{h_{3a} - h_2}$$

$$\eta_T = \frac{h_4 - h_{5a}}{h_4 - h_5}$$