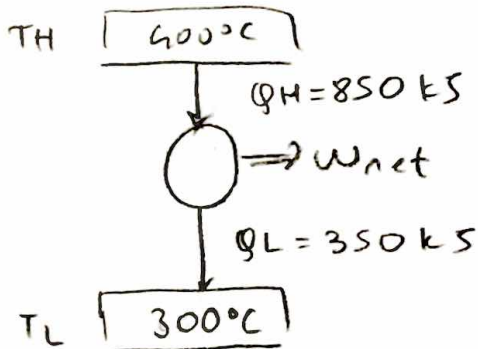


Cankaya University
 Faculty of Engineering
 Mechanical Engineering Department
 Me 211 Thermodynamics I
 Quiz # 5 Fall 2017

Q-4 An inventor claims to have developed a heat engine that receives 850 kJ of heat from a source at 400 °C and rejects 350 kJ waste heat to a sink at 300 °C.

- a) Determine the work output of the engine.
- b) Is this reasonable? Evaluate the claim.



$$a) W_{net} = Q_H - Q_L = 850 - 350$$

$$\underline{\underline{W_{net} = 500 \text{ kJ}}}$$

$$b) \eta_{cycle} = \frac{W_{net}}{Q_H} = \frac{500}{850} = 0,588$$

$$\underline{\underline{\eta_{cycle} = 58,8 \%}}$$

$$\eta_{max} = 1 - \frac{T_L}{T_H} = 1 - \frac{(300 + 273)}{(400 + 273)} = 1 - \frac{573}{673} = 0,148$$

$$\underline{\underline{\eta_{max} = 14,9 \%}} \quad (\text{CARNOT CYCLE EFF})$$

Since $\eta > \eta_{max} \rightarrow$ it is not reasonable
 it is IMPOSSIBLE