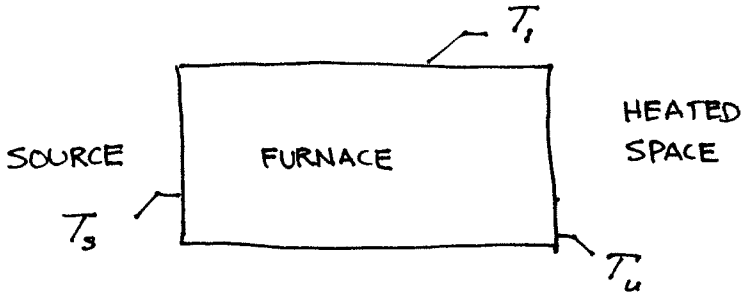
CONSIDER A FURNACE THAT UTILIZES THERMAL ENERGY FROM A SOURCE AT TEMPERATURE T_s AND DELIVERS IT TO A HEATED SAPCE AT T_u. THERMAL ENERGY IS LOST AT T_l.

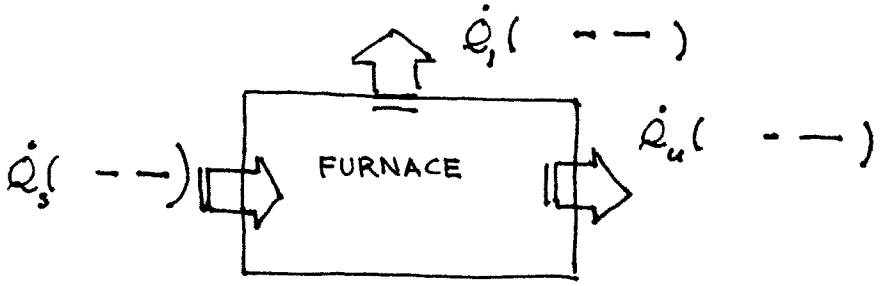


WRITE CONSERVATION OF ENERGY FOR THE FURNACE:

USING YOUR RESULTS, DEFINE A FURNACE EFFICIENCY

$$\eta \equiv \text{———————}$$

NOW WRITE THE ACCOUNTING OF EXERGY FOR THE FURNACE:



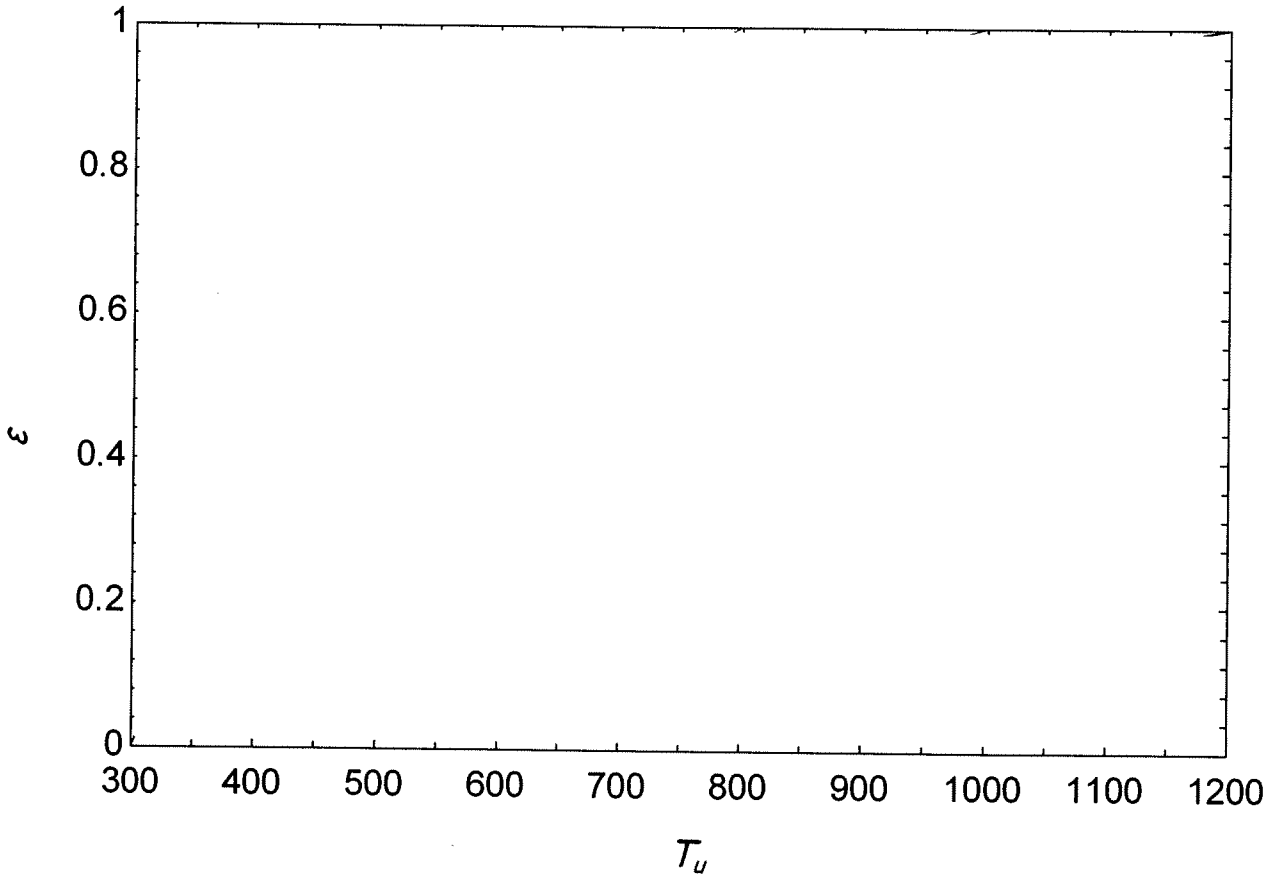
USING YOUR RESULTS, DEFINE AN ***EXERGETIC EFFICIENCY*** FOR THE FURNACE EFFICIENCY

$$\varepsilon \equiv \text{———————}$$

NOW EXPRESS YOUR EXERGETIC EFFICIENCY IN TERMS OF THE FURNACE EFFICIENCY, η

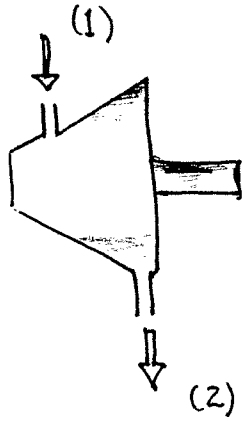
$\varepsilon =$ _____

PLOT EXERGETIC EFFICIENCY AS A FUNCION OF T_u FOR T_s = 1200 K, 1000 K AND 800 K. ASSUME η = 1 AND T_0 = 300 K.

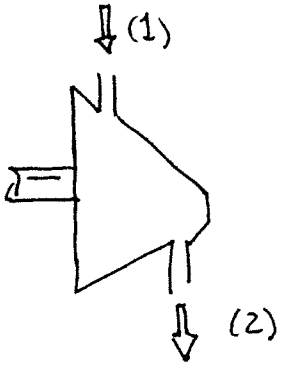


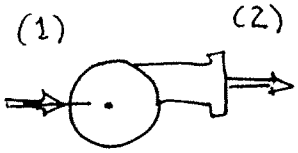
USING THIS SAME APPROACH, FIND EXPRESSIONS FOR THE EXERGETIC EFFICIENCIES OF THE FOLLOWING COMPONENTS:

TURBINE:

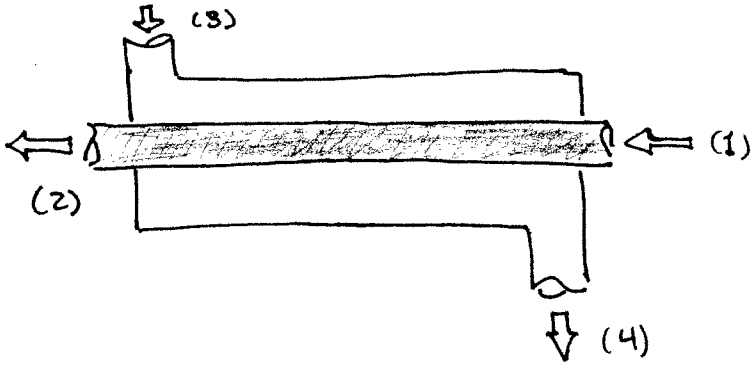


COMPRESSORS/PUMPS:





HEAT EXCHANGERS:



HEAT EXCHANGERS WITH MIXING: