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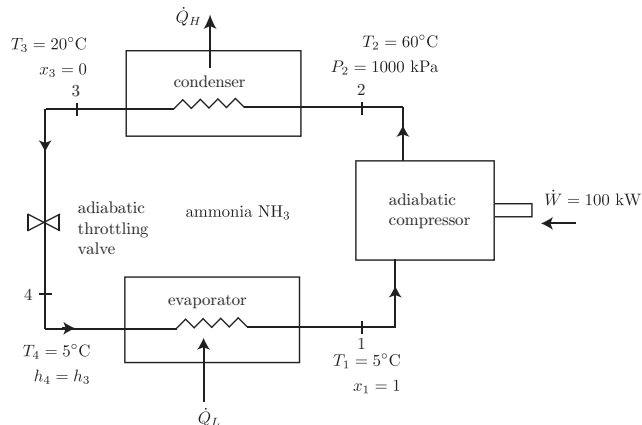
AME 20231, Thermodynamics

Examination 2

Prof. J. M. Powers

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- (20) A Carnot refrigerator with ammonia NH_3 as a working fluid operates between large thermal reservoirs at 5°C and 60°C . Find the coefficient of performance of the refrigerator. If the refrigerator draws 100 kW of power, find the rate of heat rejected to the high temperature reservoir and the rate of heat drawn from the low temperature reservoir.
- (40) Consider the refrigeration cycle below for a commercial refrigerator in a grocery warehouse. The working fluid is ammonia, NH_3 . Find



- the mass flow rate (kg/s),
 - the heat expulsion rate required from the condenser (kW),
 - the coefficient of performance,
 - a correctly oriented sketch, including the vapor dome and appropriate numerical values of P and v , of the cycle on a $P-v$ diagram.
- (40) An insulated chamber has two compartments, one on the left (L) and one on the right (R). Each is filled with ammonia NH_3 at the conditions indicated below. The partition is removed, and the system comes to thermal and mechanical equilibrium. Find the final temperature and pressure via two different assumptions:
 - calorically perfect ideal gas, (use Table A.5),
 - non-ideal gas, (use Table B.2.2).

