热力学博士资格考试题（50%）

每题10分

1. 试绘出喷射推进之标准空气循环（TS图）
(the Air-Standard Cycle for Jet Propulsion)
示、简绘其组成之硬体系统

2. 试以PT图表达出水等物质之三相点、临界点、
熔化线、昇华线、汽化线。

3. 何谓卡诺循环，有那四个过程，又卡诺循环的
热效率如何计算。

4. 简述奥图循环（The Otto Cycle）热效率与压缩比
的关係。

5. 试述比容连体极限的意义。

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1 (15%) (a). Please describe the physical mechanisms of conduction, convection and radiation, and write their rate equations.

(b). What is the difference between natural convection and force convection ?

2. (20%) A thin walled copper tubes of radius r_i is used to transport a low temperature refrigerant and is at a temperature T_i that is less than that of the ambient air at T_∞ around the tube. Is there an optimum thickness associated with application of insulation to the tube. Please construct the thermal circuit of heat flow resistance. And prove the optimal insulation radius is $r_{cr} = k/h$.

3. (15%) A two-dimensional rectangular plate is subjected to the boundary conditions shown as below. Derive an expression for the steady state temperature distributions T(x,y) with solving the heat conduction equation.