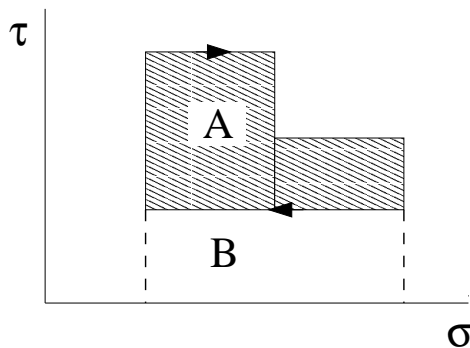


Physics 410 - 2004
Thermal Physics

Problem Set 13

1. An engine is represented by the cyclic transformation shown in the $\sigma - \tau$ diagram. Here, A denotes the total area of the shaded region and B the area of the region below it. Show that this engine is not as efficient as a Carnot engine operating between the highest and lowest available temperatures (6 pt). Show that an arbitrary reversible engine cannot be more efficient than a Carnot engine operating between the highest and the lowest available temperatures (7 pt).



2. Chapter 9, p. 272, problem 1 (6 pt)
3. Chapter 9, p. 273, problem 3 (6 pt)

You need to have 20 points out of 25 (5 points are extra credit).

The problems are from Kittel & Kroemer, *Thermal Physics*, 2nd edition, (Freeman, NY 1980).