Prof. Young-Kee Kim (Physics 7B Section 1)
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Conceptual Questions on Entropy

1. The net heat transfer between the Sun and Earth is from Sun to Earth. Does the entropy of the Earth-Sun system increase, decrease, or remain the same during this process ?

2. A drop of water boils away *slowly* on a hot plate whose temperature is slightly above the boiling point.

   (a) Does the entropy of the water increase, decrease, or remain the same during this process ?

   (b) Does the entropy of the system *water + hot plate* increase, decrease, or remain the same ?

3. Point i in Figure below represents the initial state of an ideal gas at temperature T. Taking algebraic signs into account, rank the entropy changes as the gas moves, successively and reversibly, from point i to points a, b, c, and d, greatest first.

4. You allow a gas to expand freely from volume V to volume $2V$. Later you allow that gas to expand freely from volume $2V$ to volume $3V$. Is the net entropy change from these two expansions greater than, less than, or equal to the entropy change that would occur if you allowed the gas to expand freely from volume V directly to volume $3V$?

5. Does the entropy per cycle increase, decrease, or remain the same for

   (a) an ideal engine,

   (b) a real engine, and

   (c) a perfect engine (which is, of course, impossible to build) ?

6. Does the entropy per cycle increae, decrease, or remaine the same for

   (a) an ideal refrigerator,

   (b) a real refrigerator, and

   (c) a perfect refrigerator (which is, of course, impossible to build) ?