**Study Questions for Sklar (1993) *Physics and Chance*, pp. 28-48.**

1. What did Bernoulli have to assume about the motion of particles in order to derive an inverse relation between pressure and volume at constant temperature?
2. What aspect of the motion of particles did Bernoulli associate with temperature?
3. What aspect of the motion of particles did Herepath associate with temperature?
4. What puzzle did Clausius resolve? How did he resolve it?
5. What was the assumption with regard to the velocities of molecules that earlier kinetic theories made and that Maxwell questioned in 1860?
6. In order to derive a function representing the distribution of velocities for molecules, what two assumptions did Maxwell make in 1860?
7. How is Maxwell's 1866 derivation of his velocity distribution function different from his 1860 derivation?
8. What is the fundamental assumption that Boltzmann makes in his 1972 derivation of the time rate of change of the distribution function (his "kinetic equation")?
9. What does Boltzmann's "*H*-function" measure?
10. How does *H* behave, as long as the velocity distribution $f(v, t)$ obeys Boltzmann's kinetic equation.
11. According to Skalr, what two programmatic themes are displayed by anti-atomists like Duhem and Mach in their objections to the kinetic theory?
12. What was Loschmidt's *Umkehreinwand* (Reversibility Objection)?
13. What does Poincare's Recurrance Theorem state?
14. How did Zermelo apply Poincare's Recurrance Theorem to generate the *Umkehreinwand*?
15. What is Maxwell's Demon? What did Maxwell conclude from his demon?
16. How did Boltzmann explain why a system tends to approach an equilibrium macrostate?
17. What does Boltzmann's equation $S = -K\log W$ state?
18. What are the two senses of probability that Boltzmann distinguishes, as early as 1881?
19. What is Boltzmann's "time-symmetric" explanation of why a system tends to approach an equilibrium macrostate?
20. How does Boltzmann (1897) explain why, if our universe is mostly in equilibrium, we find ourselves in a rare far-from-equilibrium portion?
21. How does Boltzmann (1897) explain why, if systems are governed by time-symmetric laws, we find ourselves in a portion of the universe in which systems approach equilibrium from past to future?