Study Questions for Bokulich & Curiel (2009), Sections 3 & 5

1. What is a black hole?
2. What is the escape velocity of a body?
3. What is one difference between a Newtonian black hole and a relativistic black hole?
4. What is the event horizon of a black hole?
5. Why would a person falling into a black hole appear to be frozen at the event horizon from the point of view of an outside observer?
6. In what sense is a black not a "thing" *in* spacetime but rather a feature of spacetime itself?
7. What is the distinguishing characteristic of a black hole spacetime?
8. What is a "no-hair" theorem?
9. Why did Bekenstein suggest that the area of a black hole is a measure of its entropy?
10. How does Hawking's Area Theorem support Bekenstein's suggestion?
11. What must be done in order to make the analogy between the 4 laws of black hole mechanics and the 4 laws of thermodynamics complete?
12. Why is it problematic to attribute a temperature to a black hole?
13. How does "Hawking effect" radiation support the claim that a black hole has a temperature?
14. What is the generalized second law of black hole thermodynamics?
15. What is Geroch's argument against the generalized second law?
16. What are some responses to Geroch's argument?
17. How might you argue that black hole thermodynamics implies a fundamental bound on the amount of entropy that can be contained in a region of spacetime?
18. What is 't Hooft's "Holographic Principle"?