1. Using the Savage Axioms directly (and not the representation theorem) show that the following is true: *if* $\boldsymbol{a} \succ \boldsymbol{a}'$ *on* E *and* $\boldsymbol{a} \succ \boldsymbol{a}'$ *on* E^C*, then* $\boldsymbol{a} \succ \boldsymbol{a}'$. Optional question: what if you replace E and E^C with E and F, where E and F are mutually exclusive? Highly optional question for the hopelessly bored: what if E and F are not mutually exclusive?

2. Lecture 9, problem 2.

3. Suppose you are to choose among two experiments A and B. You are interested in estimating a parameter based on squared error loss using the data from the experiment. Therefore you want to choose the experiment that minimizes the posterior variance of the parameter. If the posterior variance depends on the data that you will collect, expected utility theory recommends that you take an expectation. Suppose experiment A has an expected posterior variance of 1 and B of 1.03, so you prefer A. But what if you looked at the whole distribution of variances, for different possible data sets, and discovered that the variances you get from A range from .5 to 94, while the variances you get from B range from 1 to 1.06? (the distribution for experiment A would have to be quite skewed, but that is not unusual).

Is A really a good choice? Probably not (if 94 is not big enough, make it 94 billions). But than, what is it that went wrong with our choice criterion? Is there a fault in the expected utility paradigm, or did we simply misspecify the losses and leave out an aspect of the problem that we really cared about?

I'm not sure whether there are good answers to these question, but it's certainly good for you to write a paragraph (or at most two) explaining what you would do, why, and whether there may be a connection between this example and one of the paradoxes we discussed this week.

4. Something I find unconvincing about the Allais paradox, at least as originally stated, is that it refers to a situation that is completely hypothetical for the subject making the decisions. The sums are huge, and subjects never really get anything, or at most they get $10 an hour if the guy who runs the study had a decent grant. But maybe you can think of a real life situation where you expect that people may violate the axioms in the same way as in the Allais paradox.

I'm clearly not looking for proofs here. Just a scenario, but one that beats Allais' in the "real life" category. If you can add even the faintest hint that individuals "out there" may violate expected utility, you'll have a home-run. There are eons of papers on this, so one fair way to solve this problem is to become an expert in the field, although that's not quite what I'm looking for.