About uncertainty and subjective probability

Week1-ex2, solution

a) Read the first Chapter of BD3 and Anthony O'Hagan (2004). *Dicing with the uncertainty*. Significance. (can be found from the course home page). Reflect your thoughts about the above texts. For example, does the aleatory and epistemic uncertainties make sense? Describe how you understand the term uncertainty. Where does uncertainty arise from, how does it relate to data analysis?

b) Discuss the following statement. "The probability of event E is considered *subjective* if two rational persons A and B can assign unequal probabilities to E, $P_A(E)$ and $P_B(E)$. These probabilities can also be interpreted as *conditional*: $P_A(E) = P(E|I_A)$ and $P_B(E) = P(E|I_B)$, where I_A and I_B represent the knowledge available to persons A and B, respectively." Apply this idea to the following examples.

   1 The probability that a 6 appeared when a fair die was rolled, and A observed the outcome of the die roll whereas B did not.

   2 The probability that Brazil wins the next World Cup, where A is ignorant of soccer and B is a knowledgeable sports fan.

Write shortly! Use one page at maximum!

Grading

Total 10 points: 4 points from a) and 3 points from b1) and from b2).

MODEL ANSWER: Part a) does not have correct answer. Hence, it is enough if they are done and 4 points from these jointly for having discussion from which it is clear that the texts have been read and understood (at least to some extent).

In part b), the correct answers should include explanation on what you assume A and B know when they define their subjective probabilities. After that you have to justify why based on their knowledge their probabilities are the same or different. A correct answer looks something along the following lines:

- A observes the outcome so he/she knows the answer so his/her probability for six is either 1 (if the outcome was six) or zero (if the outcome was something else than six). B does not observe so he/she should assign probability 1/6 for each outcome. (3 points)

- The probabilities most likely differ. If A does not know anything else but the teams that play and wants to be ignorant, his/her probability distribution should be more flat than that of B's in the sense that A should give equal probability for each team. B, on the other hand, might give a bit more weight for Brazil. (3 points)