Probability & Statistics III (Term 2) - Homework 3

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Consider the following 4 gambles:

1. **Gamble 1:** You receive £5,000,000 for sure.
2. **Gamble 2:** You receive £25,000,000 with probability 0.10; or £5,000,000 with probability 0.89; or nothing with probability 0.01.
3. **Gamble 3:** You receive £5,000,000 with probability 0.11; or nothing with probability 0.89.
4. **Gamble 4:** You receive £25,000,000 with probability 0.10; or nothing with probability 0.90.

(a) Compare Gambles 1 and 2: without any calculations, explain which one you would prefer and why.

(b) Compare Gambles 3 and 4: without any calculations, explain which one you would prefer and why.

(c) Assess carefully your utilities for the three amounts of money in the above gambles, and thus evaluate your utility for each gamble. Do your evaluations agree with your answers in parts (a) and (b)?

(d) Suppose that an individual prefers Gamble 1 to Gamble 2, and also prefers Gamble 4 to Gamble 3. Show that these preferences are not compatible with the theory of utility, i.e. that there is no assignment of utilities which corresponds to these preferences.

(e) For the individual in part (d), identify carefully which of the three assumptions about preferences that we require in order to construct a utility function has been broken.