Problems for Recitation 11 (4/24/98)

1 Team problems

Problem 1. You toss a coin twice. What is the probability that you get two heads given that you get *at least one head.* What is the probability that you get two heads given that *the first toss* gives a head?

Problem 2. You generate a sequence of eight numbers $n_1, \ldots, n_8$, with $1 \leq n_i \leq 6$ for $i = 1, \ldots, 8$ in the following way. You first choose at random a position $i \in \{1, 2, 3, 4, 5, 6, 7, 8\}$ and you set $n_i = 1$. Then for any $j \neq i$ you roll a die and you set n_j according to the outcome of the die. Observe that any sequence of 8 numbers that contains at least one 1 can be generated in this way. Is the distribution described above uniform, namely are all the sequences with at least one 1 equally likely to be generated?

(a) Compute the probability of any given sequence by describing the sample space and showing which events lead to the generation of the given sequence.

(b) Which sequence(s) is/are most likely to be generated?

Problem 3. Consider the scenario of the previous section: a problem in a quiz contains an error with probability 10%, the TA has a probability 80% of answering correctly a question of yours about whether there is an error or not; the lecturer answers correctly your question with probability75%; the correctness of the answer of the lecturer is independent of the correctness of the answer of the TA.

Is the event "the TA says that there is an error" independent of the event "the lecturer says that there is an error"?