1. Suppose $A$, $B$ and $C$ are independent events. Show from that $A$ is independent of $B - C$.

(Use the definition of independence and the axioms and properties of probability.)

2. Suppose $A$ and $B$ are events $P(A) = P(B) = .6$.

(a) Could they be independent?

(b) Could they be disjoint?

(Your answer to one of these questions should be 'yes' if you can find an example where the statement is true, and 'no' if you can show that the statement could never be true.)

3. In a class there are 4 freshman boys, 6 freshman girls and 6 sophomore boys. How many sophomore girls must be present if sex and class are to be independent events when a student is chosen at random?

4. Problem 17, p. 28, Gubner

5. Problem 20, p. 28, Gubner. Insert the word "repeatedly" after the word "thrown".

6. Problem 22, p. 29, Gubner

7. Prove the following "conditional" version of the law of total probability.

$$P(E|F) = P(E|F \cap G) P(G|F) + P(E|F \cap G^c) P(G^c|F)$$

8. Problem 29, p. 31, Gubner

9. Problem 25, p. 29,30, Gubner

10. There are two local factories producing radios. Each radio produced at factory A is defective with probability .05, independent of other radios produced by the factory. Each radio produced at factory B is defective with probability .01, independent of other radios produced by the factory. Suppose you purchase two radios that were produced at the same factory, which is equally likely to have been factory A or factory B, but you don't know which factory. If the first radio that you check is defective, what is the conditional probability that the other one is also defective.

11. English and American spellings are "rigour" and "rigor", respectively. A man staying at a Parisian hotel writes this word, and a letter taken at random from his spelling is found to be a vowel. If 40 percent of English-speaking men at the hotel are English and 60 percent are Americans, what is the probability that the writer is an Englishman?

continued on the next page
12. A total of 500 married working couples were polled about their annual salaries with the following information resulting.

<table>
<thead>
<tr>
<th></th>
<th>husband less than $25,000</th>
<th>husband more than $25,000</th>
</tr>
</thead>
<tbody>
<tr>
<td>wife</td>
<td></td>
<td></td>
</tr>
<tr>
<td>less than $25,000</td>
<td>212</td>
<td>198</td>
</tr>
<tr>
<td>more than $25,000</td>
<td>36</td>
<td>54</td>
</tr>
</tbody>
</table>

Thus, for instance, in 36 of the couples the wife earned more and the husband earned less than $25,000. If one of the couple is randomly chosen, what is:

(a) The probability that the husband earns less than $25,000?

(b) The conditional probability that the wife earns more than $25,000 given that the husband earns more than this amount?

(c) The conditional probability that the wife earns more than $25,000 given that the husband earns less than this amount?

Problems 23, 24, 26, 27, pp. 29,30 of Gubner are good practice problems, with answers.

Problems 9, 12 and 13 come from Chapter 3 of the book by Ross, which also has many other good problems.