EXERCISES IN STATISTICS

Series A, No. 2

1. Let A_1, A_2 be subsets of a sample space S. Show that

$$P(A_1 \cap A_2) \leq P(A_1) \leq P(A_1 \cup A_2) \leq P(A_1) + P(A_2).$$

2. Find the probabilities $P(A)$, $P(B)$ when A, B are statistically independent events such that $P(B) = 2P(A)$ and $P(A \cup B) = 5/8$.

3. The Police have found the blood of the jewel thief near the hotel safe. 10% of all women belong to the blood group and 2% of all men. 30% of the hotel staff are women. Assuming that this was an inside job, what is the probability that the thief was a woman?

4. The probability that, on any weekday, the college will receive letters addressed to Dr. A is 1/3. Dr. A, who arrives earlier than any of his colleagues, begins the day by collecting his mail. He has told me that there is a 40% chance that he will attend the college today; and I have noticed that there are no letters in his pigeon hole. In view of there being no mail in his box, what is the probability that he is attending today?

5. The failure of an electrical circuit is attributable to the failure of either component A of component B or both. The circuit has a probability of failure of 0.4. Component B has a probability of failure of 0.2 Assuming that the probabilities of failure of A and B are independent, what is the probability of failure of A?