CM1606: Computational Mathematics (Statistics Component)

Tutorial No 2

(Covers problems from Lesson 2: Conditional Probability)

1. Let A and B be two events in a sample space with P(A) = .50,
P(B) = .60 and P(A and B) = .20

(a) Calculate P(A | B)

(b) Calculate P(B | A)

2. Suppose A, B, and C are events in a sample space such that
P(A) = .30, P(B) = .30, P(C) = .20, P(A and B) = .09, P(A and C) = .06,
P(B and C) = .06, and P(A and B and C) = .018

(a) Calculate P{A | (B and C)}

(b) Calculate P{B | (A and C)}

(c) Are A, B, and C mutually independent?

3. Suppose P(Ac and Bc) = .40, and P(Ac) = .70.
Calculate P{A | (A or B)}, where 'or' means 'union'.

4. An office has two phone numbers, the general number and the manager's number. General number is answered by the receptionist and the manager's number, his secretary. Any call coming to the manager must come through one of these lines. During busy hours, general number is busy 70% of the time, and the manager's number, 40% of the time.

If a person randomly picks one of the two numbers and calls the manager, what's the probability he is connected without any delay?

5. Let A and B be two events such that P(A) > 0 and P(B) > 0.

Show that P(B | A) > P(B) implies P(A | B)> P(A).

6. A busy junction has two CCTV cameras installed that operate independently. At any given time, each camera has probability .90 of functioning properly.

What's the probability that an accident that occurred at midnight has not been captured by any of the two?

7. For work, Saman takes the bus 50% of the time and train, 40% of the time. Other days, he uses his car. When he uses the car, he is always late to work. When taking the bus, probability of being late is .10 and for train, it is .15.

On a randomly selected day, he was found to be late. What's the probability that he went by car that day?