

ELEG 3143 Assignment # 3

1. A pair of dice are rolled. Let A be the event of obtaining an odd number on the first die and B the event of obtaining an odd number on the second die. Let C be the event of obtaining an odd total from both dice.
 - (a) Show that A , B , and C are pairwise independent.
 - (b) Show that A , B , C are not mutually independent.
2. In a digital communication system, messages are encoded into the binary symbols 0 and 1. Because of noise in the system, the incorrect symbol is sometimes received. Suppose that the probability of a 0 being transmitted is 0.4 and the probability of a 1 being transmitted is 0.6. Further suppose that if a 0 is transmitted, then the probability of receiving a 1 is 0.08. If a 1 is transmitted, then the probability of receiving a 0 is 0.05.
 - (a) If the received symbol is 0, what is the probability that the transmitted symbol is 0?
 - (b) If the received symbol is 1, what is the probability that the transmitted symbol is 1?
 - (c) What is the probability that the received symbol is 1?
 - (d) If the received symbol is 1, what is the probability that the transmitted symbol is 0?
3. A manufacture buys components in equal amounts from three different suppliers. The probability that components from supplier A are bad is 0.1, that components from supplier B are bad is 0.15, and that components from supplier C are bad is 0.05.
 - (a) The probability that a component selected at random will be bad.

- (b) If a component is found to be bad, what is the probability that it came from supplier B?
4. A fair coin is tossed. If it comes up heads, a single dice is rolled. If it comes up tail, two dice are rolled. Given that the outcome of the dice is 3, but you do not know whether one or two dice were rolled, what is the probability that the coin came up heads?
 5. A lab has three cabinets, each with two drawers. The first cabinet has NPN transistors in each drawer; the second cabinet has PNP transistors in each drawer; the third cabinet has NPN transistors in one drawer and PNP transistors in the other drawer. We randomly select a cabinet with equal probability, and then withdraw a transistor from one of the two drawers with equal probability.
 - (a) What is the probability that an NPN transistor will be selected?
 - (b) If an NPN transistor is selected, what is the probability that it came from the third cabinet?