G5203: PROBABILITY

Autumn 2020

Quiz 1

1. Polygraph test (lie-detector tests) are often routinely administered to employees or prospective employees in sensitive positions. According to studies on polygraph reliability the probability that the polygraph reading is positive (suggesting that the subject is lying) provided he is, in fact, lying is .88. When the subject is telling the truth the probability of a positive reading is .14. If a subject produces a positive reading on the polygraph, what is the chance the polygraph reading is incorrect and that the subject is telling the truth.

2. A box has three coins. One had two heads, one has two tails, and the other ia a fair coin with one head and one tail. A coin is chosen at random, is flipped, and comes up head.

   (a) What is the probability that the chosen coin is the two-headed coin?

   (b) If the coin is thrown the second time and comes up head again, what is the probability that the chosen coin is the two-headed coin?

3. Two boys play basketball in the following way. They take turns shooting the basket and stop when the basket is made. Player A goes first and has the probability p_1 of making a basket on any throw. Player B, who shoots second, has the probability p_2 of making the basket. The outcomes of the successive trials are assumed to be independent.

   (a) Find the probability mass function for the total number of attempts.

   (b) What is the probability that player A wins?