Math 540/640: Statistical Theory I

HW #3

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Problem 1: Suppose a basket has 10 black balls and 15 white balls. We randomly select 2 balls from the basket. Using conditional arguments to compute the probability that we select 1 white ball and 1 black ball.

Problem 2: Roll 2 dice. Let A denote the event that the sum of the dices is 7. Let B denote the event that the first die is 4. Are A and B independent? Why?

Problem 3: Suppose 40 percent of the students in a college are female and suppose further that 15 percent of the female and 10 percent of the male students are smokers. We randomly choose a Smoker. What is the probability that the smoker is female?

Problem 4: We have two boxes. Box A containing one black and two white marbles. Box B containing three black and two white marbles. One box is selected at random and a marble is drawn at random from the chosen box. Suppose the selected marble is black, what is the chance that the chosen box is B?

Problem 5: Suppose that 30 percent of the bottles produced in a certain plant are defective. If a bottle is defective, the probability is 0.9 that an inspector will notice it and remove it from the filling line. If a bottle is not defective, the probability is 0.2 that the inspector will think it is defective and remove it from the filling line. If a bottle is removed from the filling line, what is the probability that it is defective?