

Math/Stat 425

Fall, 2004

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Midterm 1

1. Suppose that 20% of New York Times readers also read the Economist magazine. On the other hand, 40% of Economist readers also read the New York Times. If 85% of the population reads neither of these publications, what percentage reads both?
2. Urn A contains 8 white balls and 2 black balls. Urn B contains 2 white balls and 8 black balls. I toss a coin and if it lands heads I draw a ball at random from urn A , otherwise from B . You do not see the coin toss, but you do see that I draw a white ball. How do you guess the coin landed? What is the chance you are correct?
3. Anne and Bob decide to have children until they have both a boy and a girl. Supposing each is equally likely, and births are independent, find the chance that they end up with exactly 4 children.
4. Ten students want to split into two teams for a game of five-a-side soccer.
 - (a) How many ways can this be done?
 - (b) How many ways can this be done if Ulrich refuses to play in the same team as Victor, and Wendy insists on playing in the same team as Xavier?
5. A roulette wheel has 38 slots, numbered 1 through 36, 0 and 00. Each time the wheel is spun, the ball lands in a random slot.
 - (a) If Jane bets on evens (2, 4, 6, \dots , 36) and Ken bets on multiples of three (3, 6, 9, \dots , 36), find the chance that Jane wins given that Ken does not win.
 - (b) Jane and Ken both keep betting as in (a) on each spin until at least one of them wins, at which point they both stop playing and leave. What is the chance that Ken leaves the roulette table without a win.
6. A 5 card poker hand is dealt from a shuffled deck of 52 cards. Any red cards (hearts or diamonds) are then discarded. An equal number of new cards are then dealt from the 47 remaining in the deck, replenishing the hand to 5 cards. Find the chance that the resulting poker hand consists only of black cards (spades or clubs).