

Your name(s):

DAY 3: MORE PROBABILITY AND BAYES'S THEOREM
SEC 1.4-1.5

1. The probability that a lab specimen is contaminated is 0.10. Five samples are checked, and the samples are independent.
 - (a) What is the probability that none is contaminated?
 - (b) What is the probability that two are contaminated?
 - (c) What is the probability that at least two are contaminated?
2. Olin alumnus Leighton manufactured 850 yoga chairs one day, but 50 did not meet specifications. Two chairs are tested at random, without replacement, from the batch. Are the events of the first and second chairs being defective independent? Use mathematical formulas (defining events as necessary) and the mathematical definition of independence, also explain using common sense.
3. A chemist analyzes seawater samples for two heavy metals: lead and mercury. Past experience indicates that 38% of the samples taken from near the mouth of a river on which numerous industrial plants are located contain toxic levels of lead or mercury, 32% contain toxic levels of lead and 16% contain toxic levels of mercury. What is the probability that a randomly selected sample will contain toxic levels of lead and mercury?
4. In a game, a participant is given three attempts to hit a ball. On each try, she either scores a hit (H) or miss (M). The game requires that the player must alternate which hand she uses in successive attempts. Her chance of scoring a hit with her right hand is 0.7 and with her left hand is 0.4. Assume that the results of successive attempts are independent, and that she wins the game if she scores at least two hits in a row. If she makes her first attempt with her right hand, what is the probability that she wins the game?
5. Suppose that A and B are independent events such that the probability that neither occurs is a and the probability of B is b . Find $P(A)$. Hint: Consider DeMorgan's Laws, which state that for sets X and Y , $(X \cup Y)' = X' \cap Y'$ and $(X \cap Y)' = X' \cup Y'$.
6. Four technicians regularly make repairs when breakdowns occur on an automated production line. Janet, who services 20% of the breakdowns, makes an incomplete repair 1 time in 20. Tom, who services 60% of the breakdowns, makes an incomplete repair 1 time in 10. Georgia, who services 15% of the breakdowns, makes an incomplete repair 1 time in 10. Peter, who services 5% of the repairs, makes an incomplete repair 1 time in 20. For the next problem with the production line diagnosed as being due to an initial repair that was incomplete, what is the probability that this initial repair was made by Janet?