

Homework #2
(10 points)
(due Friday, September 9, by 3:00 p.m.)

No credit will be given without supporting work.

1. Bob is applying for a job with five companies. At the first company, he is in the final group of four applicants, one of which will be chosen for the position. At two of the five companies, Bob is one of ten candidates; and at the last two companies, he is in an early stage of application in a pool of 25 candidates. Assuming that all companies make their decisions independently of each other, and that Bob is as likely to be chosen as any other applicant, what is the probability of getting at least one job offer?

2. At *Initech*, 50% of all employees surf the Internet during work hours. 20% of the employees surf the Internet and play *Solitaire* during work hours. It is also known that 60% of the employees either surf the Internet or play *Solitaire* (or both) during work hours.
 - a) What proportion of the employees play *Solitaire* during work hours?
 - b) If it is known that an employee surfs the Internet during work hours, what is the probability that he/she also plays *Solitaire*?
 - c) Suppose an employee does not play *Solitaire* during work hours. What is the probability that he/she surfs the Internet?
 - d) Are events {an employee surfs the Internet during work hours} and {an employee plays *Solitaire* during work hours} independent? ***Justify your answer.***

3. During two-and-a-half years of research, bio-psychologist Onur Güntürkün discovered that when people kiss, they turn their heads to the right roughly twice as often as to the left. (Güntürkün, O. Human behaviour: Adult persistence of head-turning asymmetry. *Nature*, **421**, 711, (2003).)

Suppose the probability that a person would turn his/her head to the right is $\frac{2}{3}$, and

the probability that a person would turn his/her head to the left is $\frac{1}{3}$. A couple is planning a kiss on Valentine's day. Assume that their choice of which way to turn their heads is independent of each other.

- a) What is the probability that they would both turn their heads to the right (and kiss)?
- b) What is the probability that they would bump noses (i.e., choose the opposite direction to turn their heads)?

4. From a group of 16 male and 9 female armadillos, Noah must choose two to travel on his ark. Unable to distinguish between male and female armadillos, Noah must choose at random.

- a) Noah chooses the **two** armadillos at random. Compute the probability that Noah gets two armadillos of the opposite sex (i.e., one male and one female armadillo).
- b) In order to improve his chances of selecting at least one male and one female armadillo, Noah decides to "cheat" and select **three** armadillos to travel on his ark. Compute the probability that Noah gets at least one male and one female armadillo.

5. Does a monkey have a better chance of rearranging

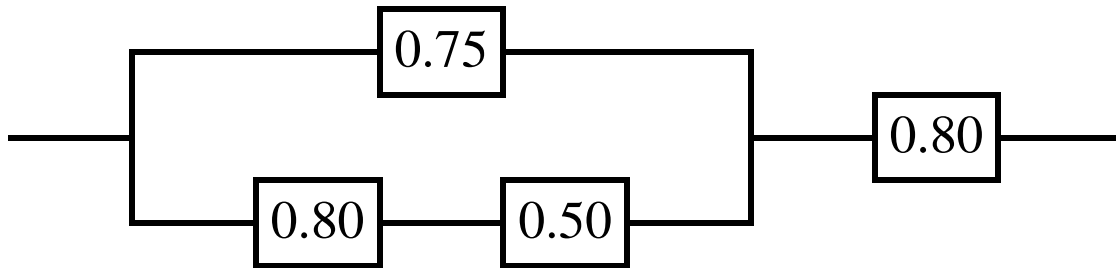
I I I L L N O S to spell I L L I N O I S
or

E E E E N N S S T to spell T E N N E S S E E ?

6. An electronic device has four independent components. Two of those four are new, and have a reliability of 0.80 each, one is old, with 0.75 reliability, and one is very old, and its reliability is 0.50.

- a) Suppose that the device works if all four components are functional. What is the probability that the device will work when needed?
- b) Suppose that the device works if at least one of the four components is functional. What is the probability that the device will work when needed?

- c) Suppose that the four components are connected as shown on the diagram below.
Find the reliability of the system.



7. Three prisoners, A, B and C, are in separate cells and sentenced to death. The governor has selected one of them at random to be pardoned. The warden knows which one is pardoned, but is not allowed to tell. Prisoner A begs the warden to let him know the identity of one of the others who is going to be executed. "If B is to be pardoned, give me C's name. If C is to be pardoned, give me B's name. And if I'm to be pardoned, flip a coin to decide whether to name B or C."

The warden tells A that B is to be executed. Prisoner A is pleased because he believes that his probability of surviving has gone up from $1/3$ to $1/2$, as it is now between him and C. Prisoner A secretly tells C the news, who is also pleased, because he reasons that A still has a chance of $1/3$ to be the pardoned one, but his chance has gone up to $2/3$.

What is the correct answer?

From the textbook: (same for the 8th and the 7th editions)

1.3-4	1.3-6	1.5-8	1.5-16
1.6-8	1.6-10	2.1-10	2.1-14

