

1. This is Potpourri

1. Out of 1000 computer science students, 400 belong to a club (and may work part time), 500 work part time (and may belong to a club), and 50 belong to a club and work part time.
 - (a) Suppose we choose a student uniformly at random. Let C be the event that the student belongs to a club and P the event that the student works part time. Draw a picture of the sample space Ω and the events C and P .
 - (b) What is the probability that the student belongs to a club?
 - (c) What is the probability that the student works part time?
 - (d) What is the probability that the student belongs to a club AND works part time?
 - (e) What is the probability that the student belongs to a club OR works part time?
2. Suppose you roll an ordinary die 5 times.
 - (a) What is the probability of getting at least one six?
 - (b) What is the probability of getting exactly two sixes?
 - (c) What is the probability of getting a prime number of sixes?

2. Rain and Wind

The local weather channel just released a statistic for the months of November and December. It said that the probability that it would rain on a windy day is 0.3 and the probability that it would rain on a non-windy day is 0.8. The probability of a day being windy is 0.2. As a student in CS70, you are curious to play around with these numbers. Find the probability that

- a. A given day is windy and rainy.
- b. It rains on a given day.
- c. Exactly one of two days is rainy. (Assume that the two days are independent.)
- d. A non-rainy day is also non-windy.

3. Monty Hall Again

In the three-door Monty Hall problem, there are two stages to the decision, the initial pick followed by the decision to stick with it or switch to the only other remaining alternative after the host has shown an incorrect door. An extension of the basic problem to multiple stages goes as follow.

Suppose there are four doors, one of which is a winner. The host says: "You point to one of the doors, and then I will open one of the other non-winners. Then you decide whether to stick with your original pick or switch to one of the remaining doors. Then I will open another (other than the current pick) non-winner. You will then make your final decision by sticking with the door picked on the previous decision or by switching to the only other remaining door.

Find the best strategy and compute its probability of winning.