Homework Assignment 6

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Question 1

There are 18 mathematics majors and 325 computer science majors at a college.

- In how many ways can two representatives be picked so that one is a mathematics major and the other is a computer science major?

- In how many ways can one representative be picked who is either a mathematics major or a computer science major?

Question 1 Solution

- Since there are 18 math majors, there are 18 ways to choose a math major, and, since there are 325 computer science majors, there are 325 ways to choose a computer science major. Therefore, there are $18 * 325 = 5850$ ways to select a representative for each group.

- Since only one person needs to be selected to represent both groups, and, there is no regard as to which pool the representative is chosen from, there are $18 + 325 = 343$ ways to select one representative.

Question 5

Six different airlines fly from New York to Denver and seven fly from Denver to San Francisco. How many different pairs of airlines can you choose on which to book a trip from NewYork to San Francisco via Denver, when you pick an airline for the flight to Denver and an airline for the continuation flight to San Francisco?

Question 5 Solution

It is known that there are six airlines which travel from New York to Denver, and, seven airlines which travel from Denver to San Francisco. Therefore, if a traveller wants to fly from New York to San Francisco, the total possible arrangements transversing the Denver airport comes out to $6 * 7 = 42$ different combinations in flight options.

Question 7

How many different three-letter initials can people have?

Question 7 Solution

Since there are twenty six letters in the english alphabet, each inital has a total of twenty six possibilities. Therefore, there are a total of $26 * 26 * 26 = 26^3 = 17,576$ possible combinations of three-letter initials.

Question 8

How many different three-letter initials with none of the letters repeated can people have?

Question 8 Solution

There exists a total of $26 * 25 * 24 = 15,600$ possible combinations of three-letter initials.

Question 9

How many different three-letter initials are there that begin with an A?

Question 9 Solution

There exists a total of $26 * 26 = 26^2 = 676$ possible combinations of three-letter initials beginning with the letter A.

Question 14

How many bit strings of length n, where n is a positive integer, start and end with 1's?

Question 14 Solution

The number of bit strings with length n is 2^n. However, if the first and last positions of these strings are restricted to consist of only 1's, then the number of possible arrangements falls to 2^{n-2}.

Question 46

In how many ways can a photographer at a wedding arrange 6 people in a row from a group of 10 people, where the bride and the groom are among these 10 people, if:

- the bride must be in the picture?

- both the bride and groom must be in the picture?

- exactly one of the bride and the groom is in the picture?

Question 46 Solution

- If the bride is to be in the picture then she must always be one of the 6 in the arrangement, which leaves the other 9 peope to be positoned in any assortment. This gives us $6 * 9 * 8 * 7 * 6 * 5 = 90,720$ possible way to arrange a group photo with the lovely bride.

- If both the bride and the groom are always to appear in the photo shot then there are $6 * 5 * 8 * 7 * 6 * 5 = 50,400$.

- Same shit as the first one, but now with both bride only and groom only, so it's got to look like this $2 * 6 * 8 * 7 * 6 * 5 * 4 = 80,640$.