1. The number of ways to choose 2 students from a population of 250 is given by the combination formula:

C(250,2) = (250!)/(2!(250-2)!) = 31,125

Therefore, there are 31,125 ways to choose 2 students from the AI department.

1. The number of distinct bit strings that can be formed from three 0’s and two 1’s is given by the permutation formula:

P(5,2) = (5!)/(5-2)! = 20

Therefore, there are 20 distinct bit strings that can be formed.

1. Since we want the bit string to start and end with 1’s, those two positions are already fixed. We only need to consider the middle 3 positions which can either be 0 or 1. Therefore, the number of bit strings of length 5 that start and end with 1’s is:

2^3 = 8

So, there are 8 such bit strings.

1. If each player can receive at most only one award, then we are selecting 3 players out of 30 without replacement. This is given by the combination formula:

C(30,3) = (30!)/(3!(30-3)!) = 4,060

Therefore, there are 4,060 possible ways to give out the awards.

1. To select 3 books from 6, without any restrictions, we use the combination formula:

C(6,3) = (6!)/(3!(6-3)!) = 20

Therefore, there are 20 ways to select 3 books.

1. The probability of rolling a 7 on a single roll of two dice is 6/36 or 1/6. Therefore, the probability of not rolling a 7 on a single roll is 5/6. The probability of not rolling a 7 on all three rolls is (5/6)^3 = 0.5787. Therefore, the probability of rolling at least one 7 in three rolls is:

1 – 0.5787 = 0.4213

So, the probability of rolling at least one 7 is 0.4213.

1. If there are 2 books that should not both be chosen together, then we consider two cases: either one of these two books is chosen, or neither is chosen.

Case 1: One of the two forbidden books is chosen, and we select one other book from the remaining 4. This can be done in 2\* C(4,1) = 8 ways.

Case 2: Neither of the two forbidden books is chosen, and we select 3 books from the remaining 4. This can be done in C(4,3) = 4 ways.

Therefore, the total number of ways to select 3 books, without choosing both forbidden books together, is:

8 + 4 = 12

8)

1. We need to choose 1 Ahmed out of 2, 1 Sally out of 2, 1 Mariam out of 2, 1 Yousef out of 2, and 1 Ibrahim out of 2. This can be done in:

2C1 \* 2C1 \* 2C1 \* 2C1 \* 2C1 = 2 \* 2 \* 2 \* 2 \* 2 = 32

Now, we need to choose 8 more students from the remaining 22 distinct students. This can be done in:

22C8 = 319770

Therefore, the total number of different 14-student study-groups that can be formed such that within the study group, there is exactly one student with name “Ahmed”, exactly one student with name “Sally”, exactly one student with name “Mariam”, exactly one student with name “Yousef”, and exactly one student with name “Ibrahim” is:

32 \* 319770 = 10231200

1. We need to choose 2 Ahmeds out of 2, 2 Sallys out of 2, 2 Mariams out of 2, 2 Yousefs out of 2, and 2 Ibrahims out of 2. This can be done in:

2C2 \* 2C2 \* 2C2 \* 2C2 \* 2C2 = 1 \* 1 \* 1 \* 1 \* 1 = 1

Now, we need to choose 4 more students from the remaining 23 distinct students. This can be done in:

23C4 = 8855

Therefore, the ways this team could be formed such that this team will contain two students both with name “Ahmed”, two students both with name “Sally”, two students both with name “Mariam”, two students both with name “Yousef”, and two students both with name “Ibrahim” is:

1 \* 8855 = 8855