1.

=>calculate the number of ways to choose 4 students out of 12:

=> 12 C 4=495

=> This gives us the number of ways to choose the first group of 4 students:

=>8 C 4=70

=>This gives us the number of ways to choose the second group of 4 students

=>4 C 4=1

⇨ We need to multiply to find the total:

⇨ 495*70*1=34650 #

2.

Here is the tree diagram for the number of permutations of (a, b, c):

⇨ (a b c)
⇨ (a c b)
⇨ (b a c)
⇨ (b c a)
⇨ (c a b)
⇨ (c b a) #

3.

i) P(A) and P(B)

Suppose:

P(A) = probability that both items selected are defective

P(B) = probability that both items selected are non-defective

P(A) = (4/12) * (3/11) = 1/11

P(B) = (8/12) * (7/11) = 14/33

ii) P(at least one item is defective)

⇨ 1 - P(B)=1-14/33=19/33

4.

i)

=>To find the number of ways to choose 3 non-defective items:

⇨ 10 C 3=120

=>To find the total number of ways to choose 3 items from the box:

⇨ 15 C 3=455

P(none defective) = 120/455 = 24/91 #frist

ii)

5C1 * 10C2 = (5! / (1! * (5-1)!)) * (10! / (2! * (10-2)!)) = 5 * 45 = 225

=>To find the total number of ways to choose 3 items from the box:

⇨ 15 C 3=455

⇨ P(exactly one defective) = 225/455 = 45/91 #second

iii)

at least one item of the three items is defective

1 - P(no defective items) = 1 - 24/91 = 67/91 #third

5.

P(A or B) = P(A) + P(B) - P(A and B)

1. P(A): The probability of choosing a boy =10/30
2. P(B): The probability of choosing someone from Mansoura university=15/30
3. P(A and B): The probability of choosing a boy who is also from Mansoura university
4. P(A and B) = 5/30
5. P(A or B) = 2/3

6.

1. P(Ac) = 1 - 3/8 = 5/8

2. P(Bc) = 1 - 1/2 = ½

3. P((A union B)c) = 1 - 5/8 = 3/8

4. P(Ac union Bc) = ½

5. P(A intersection Bc) = P(A-B)= P(A) - P(A intersection B)= 3/8 - 1/2 = -1/8

6. P(B intersection A complement) = P(B) - P(A intersection B) = 1/2 - 1/2 = 0

7.

8.

The sum of probabilities of all possible outcomes

=1 = k^2 – 8

=k = ±3

9. $P(A' \cap B') = P(\text{not } (A \cup B)) = 1 - P(A \cup B) = 1 - 0.8 = 0.2$