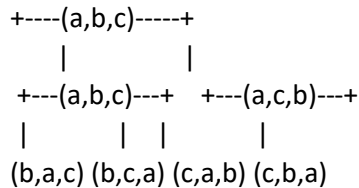1) How many ways can 12 students in a class take 3 different tests if 4 students are to take each test?

C(12,4) = 12! / (4! * 8!) = 495

C(8,4) = 70

495 x 70 x 1 = 34,650

2) Construct the tree diagram for the number of permutations of (a, b, c}.
```
+----(a,b,c)-----+
    |         |
 +---(a,b,c)---+   +---(a,c,b)---+
 |      | |        |
(b,a,c) (b,c,a) (c,a,b) (c,b,a)
```

3) Consider two items be selected randomly from a box that has containing 12 items. From these 12 items, 4 items are defective. If A is the event represents that both the tow items are defective" while B represents that "both the two items are non-defective"
   i)   Find P(A) and P(B)
           2 items from 12 C(12,2) = 66
           2 defective items out of 4 C(4,2) = 6, P(A) = 6/66 = 1/11
           2 non-defective items out of 8, C(8,2) = 28, P(B) = 28/66 = 14/33

   ii) Find P(at least one item is defective)?

non-defective 66 - 28 = 38

P(at least one item is defective) = 38/66 = 19/33

4) A box contains three 15 items of which five are defective. If three items are chosen at random from this box, find the probability that:
   3 items from 15 C(15,3) = 455

(i) none of the three selected items is defective,

3 non-defective items out of 10 , C(10,3) = 120

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

(ii) exactly one item of the three items is defective,

C(5,1) = 5 ways and the non-defective items in C(10,2) = 45 ways

P(exactly one defective) = (5 x 45) / 455 = 1/3

(iii) at least one item of the three items is defective

P(at least one defective) = 1 - P(none defective) = 1 - 24/91 = 67/91

5) A class contains 10 boys and 20 girls of which half the boys and half the girls have from Mansoura. Find the probability that a person chosen randomly is a boy or from Mansoura university

Boy 10 -A P(A ∪ B) = 15/30 = ½
Man 5 -B

6) Let A and B be events with P(A)= 3/8, P(B)= 1/2 and P(A intersection B)= 1/2;. Find
(i) P(Ac),
P(A') = 1 - P(A) = 1 - 3/8 = 5/8

(ii) P(Bc)
P(B') = 1 - P(B) = 1 - 1/2 = 1/2

(iii) P(A c intersection B c), 2 | 2
P(A' ∩ B') = P((A ∪ B)') = 1 - P(A ∪ B)
P(A ∪ B) = P(A) + P(B) - P(A ∩ B) = 3/8 + 1/2 - 1/2 = 7/8
P(A' ∩ B') = 1 - P(A ∪ B) = 1 - 7/8 = 1/8

(iv) P (A c union B c),
P(A' ∪ B') = P((A ∩ B)') = 1 - P(A ∩ B)
P(A' ∪ B') = 1 - 1/2 = ½

(v) P (A intersection B c)
P(A ∩ B') = P(A) - P(A ∩ B)
P(A) = 3/8 and P(A ∩ B) = ½
P(A ∩ B') = 3/8 - 1/2 = -1/8

(vi) P(B intersection A c)

P(B ∩ A') = P(B) - P(A ∩ B)

P(B) = 1/2 and P(A ∩ B) = 1/2,

P(B ∩ A') = 1/2 - 1/2 = 0

7) When you are rolling a pair of (fair) dice three times. What is the probability that, least one of the three tries, you roll a 7

P(A)=36

8) If Σ P(x) = k^2 − 8, find the value of k?

$\sum p(x)$ = n^2-8

n^2-8=1 , n^=9 , n=3, n=-3

n=3

9) If A and B are mutually exclusive events, P(A)=0.35 and P(B)=0.45, find P(A' ∩ B')

P(A'∩B')= 1- P(A ∪ B) = 1 - 0.8=0.2

P(A ∪ B)= P(A)+P(B) = 0.35+ 0.45 = 0.8