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قسم هندسة البرمجيات

مادة الاحتمالات

الواجب 2

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

- We can use combinatorics to solve this problem .
  C(12,12)=1

- each test has 4 students, we can choose 4 students out of 12
  c(12,4)=495

- Then, we can choose 4 students out of the remaining 8 for the second test:
  C(8,4)=70
- 4 students will take the third test.
- Finally, the total number of ways :
  495 ×70 = 34650

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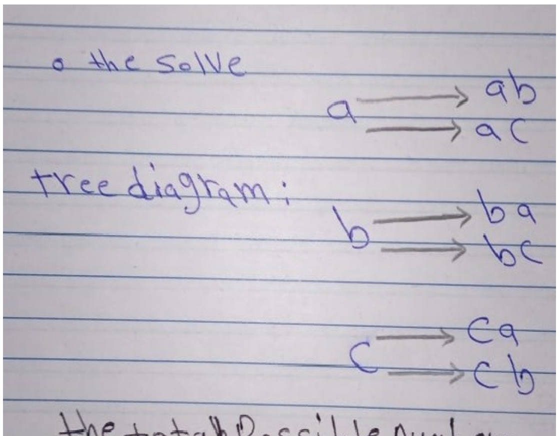
2) Construct the tree diagram for the number of permutations of (a, b, c}.



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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"

- P(A) = (number of ways to select 2 defective items)/(number of ways to select any 2 items)

- Number of ways to select 2 defective items out of 4 = C(4,2) = 6 Number of ways to select any 2 items out of 12 = C(12,2) = 66

  - Therefore, P(A) = 6/66 = 0.0909

  P(B)

    - Number of ways to select 2 non-defective items out of 8 = C(8,2) = 28

    - Number of ways to select any 2 items out of 12 = C(12,2) = 66

    - Therefore, P(B)= 28/66=0.4242

!!) The probability of both items being non-defective (event B) can be found by selecting two non-defective items out of the 8 non-defective items in the box:

P(B) = (8/12) x (7/11) = 0.38

Therefore, the probability of at least one item being defective is:

P(at least one defective) = 1 - P(B) P(at least one defective) = 1 - 0.38 P(at least one defective) = 0.62

So the probability of at least one item being defective is 0.62.

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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: (i) none of the three selected items is defective, (ii) exactly one item of the three items is defective, (iii) at least one item of the three items is defective.

- We can use combinations to solve this problem. The total number of ways to choose 3 items from 15 is:
  C(15,3)=455

(i) To choose 3 non-defective items, we need to choose 3 items from the 10 non-defective ones. The number of ways to do this is:

10 choose 3 = 120

- So the probability of selecting 3 non-defective items is:
  120/455 =

(ii) Probability of choosing exactly 1 defective item and 2 non-defective items = (5C1 * 10C2)/15C3 = 100/455
(iii) Probability of choosing at least 1 defective item = 1 - probability of choosing 3 non-defective items = 1 - 120/455 = 335/455 = 67/91

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

- P(boy or Mansoura) = P(boy) + P(Mansoura) - P(boy and not Mansoura)
- P(boy) = 10/30 = 1/3
- P(Mansoura) = 15/30 = 1/2
- P(boy and not Mansoura) = 5/30 = 1/6

- Therefore, the probability of selecting a person who is a boy or from Mansoura is:
- P(boy or Mansoura) = 1/3 + 1/2 - 1/6 = 5/6
- So the probability of selecting a person who is a boy or from Mansoura is 5/6 or approximately 0.833.

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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
, (ii) P(Bc)
(iii) P(Ac intersection Bc),
(iv) P (Ac union Bc),
(v) P (A intersection Bc)
(vi) P(B intersection Ac)

- (i) P(Ac) = 1 - P(A) = 1 - 3/8 = 5/8
- (ii) P(Bc) = 1 - P(B) = 1 - 1/2 = 1/2
- (iii) P(Ac intersection Bc) = P((A union B)c) = 1 - P(A union B) = 1 - (P(A) + P(B) - P(A intersection B)) = 1 - (3/8 + 1/2 - 1/2) = 1 - 5/8 = 3/8
- (iv) P(Ac union Bc) = P((A intersection B)c) = 1 - P(A intersection B) = 1 - 1/2 = 1/2
- (v) P(A intersection Bc) = P(Bc) - P(A intersection Bc) = 1/2 - 1/2 = 0
- (vi) P(B intersection Ac) = P(B) - P(A intersection B) = 1/2 - 1/2 = 0

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

- (5/6)^3 = 125/216.

- Therefore, the probability of rolling a 7 on at least one of the three rolls is:

$1 - (125/216) = 91/216 = 0.4213$.