UTM

UNIVERSITI TEKNOLOGI MALAYSIA

Faculty of engineering (School of computing)
Discrete structure (SECI1013-10)

Topic: Assignment 2

Lecture Name: NOR HAIZAN BT MOHAMED RADZI

Names	Matric No
MOHAMMED RAGAB ELSINOUSI ABDALHADY	A19EC4053
AHMAD NAZRAN BIN YUSRI	A20EC0179
Abdulhakeem bunzah Usman	A20EC4003

Q1

a) $6 \times 6 \times 6 = 216$

b) $6 \times 5 \times = 120$

c) $4 \times 6 \times 3 = 72$

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Q2 Firstly we know that, we can arrange n people or things around round table in $(n-1)!$ ways.

a) $(6-1)!\,(5)! = (5)!\,(5)! = 14400$ ways

b) we can arrange 9 people around round table in such a way that couple are insisted to sit each other

$(9-1)!\,(2)! = (8)!\,(2)! = 80640$ ways

c) $(5-1)!\,(5)! = (4)!\,(5)! = 2880$ ways

d) $(11)!\,(2)! = 79833600$ ways

3. Total number of sprinters is 5.

(a)

If there are no ties, there are 5 positions.

Position	1	2	3	4	5
Options	5	4	3	2	1

So, total number of ways to finish is $5 \times 4 \times 3 \times 2 \times 1 = 5!$ ways

$= 120$ ways.

(b)

If two sprinters tied, there are now 4 positions.

~~Considered Combined~~

Considering the players who tied as 1, there are $4! = 24$ ways for the sprinters to finish

(c)

Since two groups of two sprinters tied, there ~~no~~ are now 3 positions.

Since these two groups are in 1 position each. there are $3!$ ways $= 6$ ways for the sprinters to finish.

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Q4

a) The shop has 6 types of croissants of which 12 have to be selected

$n = 6 \quad r = 12$

$C(6+12-1, 12) = C(17, 12) = \frac{17!}{12!(17-12)!}$

$= 6188$

b) The shop has 6 types of croissants of which 24 have to selected.

Let us select first 2 each kind, which are 12 in total. Then we still need to select the remaining 12.

$n = 6 \quad r = 12$

$C(6+12-1, 12) = C(17, 12) = \frac{17!}{12!(17-12)!} = 6188$

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c) $n = 6 \quad r = 16$

$$C(6+16-1, 16) = C(21, 16) = \frac{21!}{16!(21-16)!} = 20349$$

Q5

a) $C(4,2) = \frac{4!}{2!(4-2)!} = 6$

$C(3,1) = \frac{3!}{1!(3-1)!} = 3$

$C(4,2) \cdot C(3,1) \cdot 2 = 36$

$C(3,1) \cdot C(4,3) \cdot 2^3 = 96$

$2 \cdot (36 + 96) = 264$

B) $2^{10} = 1024$

$1024 - 264 = 760$

$760 \times 264 = 200640$

c) $2^{10} = 1024$

$1024 - 264 = 760$ $\quad 2+2+2+2+2 = 10$

$760 \times 760 \times 10 = 5776000$

6.

Number of question : 10

Number of possible responses : 4.

~~So, there are 10^4~~

This mean there can be $4^{10} = 1048576$ unique answer sheets.

So, If there are (1048576×2)

$= 2097152$ students,

there could be 2 of each.

So, there has to be a minimum of $(2097152 + 1) = 2097153$ students to guarantee that at least three answer sheets will be identical.

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Q7 Suppose H and M denotes that event that student is based in history and mathematics respectively

Here it is given that

$P(H) = 0.75 \quad P(M) = 0.65$

$P(H \cap M) = 0.50$ and $n(H^c \cap M^c) = 35$

$P(H \cup M) = P(H) + P(M) - P(H \cap M)$

$= 0.75 + 0.65 - 0.50 = 0.90$

$\therefore \frac{n(H \cup M)}{N} = 0.90$

N = denotes the total number of candidates

$N = \frac{n(H \cup M)}{0.90}$

$n(H \cup M) = N - n(H^c \cap M^c)$

$= N - 35$

$N = \frac{N-35}{0.90}$

$N(0.90) = N - 35 = (0.10)N - 35$

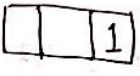
$N = 350$

Step by Step®

8. Total numbers = (780 - 300) + 1

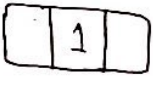
= 481.

Numbers with one '1'

One in unit place : 

Possible numbers : 5 × 8 × 1

= 40.

One in tenth place : 

Possible numbers : 5 × 1 × 10

= 50

Numbers with two '1's 

Possible numbers : 5 × 1 × 1.

= 5.

So, numbers with at least one as 1 digit is $(40+50+5)$

$= 95.$

So, the probability that the number chosen has at least 1 as one digit is $95/481$.

Q9

a) $\frac{10C_6}{4!\cdot 2!}$ = 105 ways

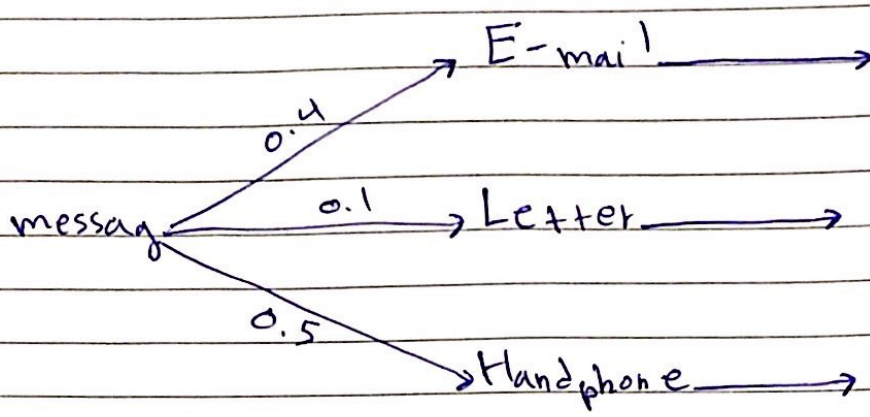
b) Here is any 10 parking ~~cars~~ lots and cars are 6.

we will park a car after an empty lots. Mean we are going to park all cars at attenative lots that is not possible

here we can park car only 5 car according to question There is misperiting inquestion according to me.

No: Date:

Q10



a) $\sum P_i P_s = 0.4 \times 0.6 + 0.1 \times 0.8 + 0.5 \times 1$

$= 0.82$

b) $P\left(\frac{B}{A}\right) = \frac{P(B \cap A)}{P(A)} = \frac{0.4 \times 0.6}{0.82} = \frac{12}{41}$

Q11

A = light truk

A' = cars

B = Fatal Accident

B' = Not fatal accident

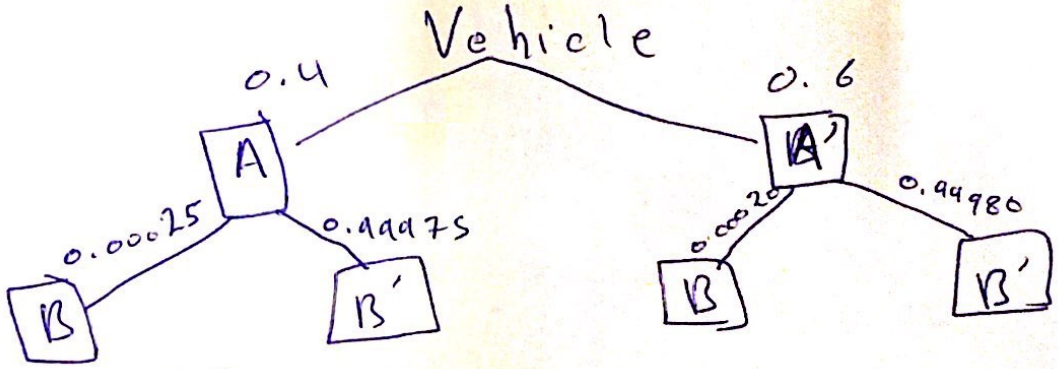
$$P\left(\frac{B}{A'}\right) = \frac{20}{100000} = 2 \times 10^{-4}$$

$$P\left(\frac{B}{A}\right) = \frac{25}{100000} = 2.5 \times 10^{-4}$$

$$P(A) = 0.4$$

$$P(A') = 1 - P(A) = 1 - 0.4 = 0.6$$

$$P\left(\frac{A}{B}\right) = \frac{P\left(\frac{A}{B}\right) P(A)}{P\left(\frac{B}{A}\right) P(A) + P\left(\frac{B}{A'}\right) P(A')}$$



$$P\left(\frac{B}{A}\right) = \frac{(0.00025)(0.4)}{(0.00025)(0.4) + (0.00020)(0.6)} = 0.45545$$

45.45%

The probability the accident involved a light truck is 45.45%

12.) Total number of letters = 9

Total number of boxes = 4

As given in the question all 9 letters have different colors and we have 4 choices when to put them therefore the possible number of ways without restriction is

$4^9 = 262144$

This disallowed ways can be counted by inclusion exclusion if we put the letters in 2 boxes then we have 4 choices for which box the latter get into and two choices per letter.

Leading to $4 \times 3^9 = 78732$ disallowed ways we count $4 \times 1^9 = 4$ ways to put all letters in one box twice so we subtract 3.

Finally the numbers of allow assignments of latters to boxes is $= 262144 - 78732 + 4$

$= 183416$