UTM UNIVERSITI TEKNOLOGI MALAYSIA

SCHOOL OF COMPUTING
Faculty of Engineering

SECI1013 DISCRETE STRUCTURE

Assignment 2

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Section 07

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1. we have 6 numbers
we have to form 3 digit number

a. first Place Can be filled in 6 ways
2nd Place can be filled in 6 ways
3rd Place can be filled in 6 ways
total: $6 \times 6 \times 6 = 216$

b. $6 \times 5 \times 4 = 120$

c. first Place Can be filled in 4 ways
2nd Place can be filled in 6 ways
3rd Place can be filled in 3 ways
total: $4 \times 6 \times 3 = 72$

2. a. $5! \times 5! = 120 \times 120 = 14400$ ways

b. $8! \times 2! = 80640$ ways

c. $4! \times 5! = 2880$ ways

d. $10! \times 11 \times 2 = 72576000$ ways

3. a. If there is no ties, the first sprinters finish with five different positions. this can happen in $5! = 120$ ways

b. $10 \times 4! = 10 \times 24 = 240$

c. for two groups of two sprinting to tie the five sprinters can be assigned the badges AABBC which resembles that the sprinters with badges A will tie for the same position and those with badges B will tie for the same position
the total number of ways is: $30 \times 3! = 30 \times 6 = 180$ ways

4. a. $12+6-1C6-1 = 17C5 = \frac{17!}{12!} \times 5! = 6188$ ways
$n = 12 \quad k = 6$

b. two dozen with at least 2 of each kind
$12+6-1C6-1 = 17C5 = 6188$ ways

c. $n = 16 \quad k = 6$
$16+6-1C6-1 = 20349$ ways

Subject Date

Ans to the Ques. No-05

a) If a team wins 2 of 4 games,

$c(4,2) = {}^4C_2 = 6$

If a team wins 1 of 3 games,

$c(3,1) = {}^3C_1 = 3$

Now,

2 win and 1 ties or wins $= {}^4C_2 \times {}^3C_1 \times 2 = 36$

1 win and 3 ties or $= 3C_1 \times {}^4C_3 \times 2 \times 2 \times 2$

$= 96$

As there are two teams,

Scenarios $= 2 \times (36 \times 96) = 264$

b) If 10 penalty kicks are executed, we get $2^{10} = 1024$

unsettled games $= 1024 - 264 = 760$

So, 1st games $= 760$

2nd game $= 264$

So, total scenarios $= 760 \times 264 = 200640$

c) For sudden death shootout we have 3 options.

A or B wins or a tie.

So, unsetteled game scenerios are,

Round 1 $= 760$ Round 2 $= 760$

For shootout the games were settled so the sudden death

$= 2+2+2+2+2 = 10$ scenarios.

So total scenario $= 760 \times 760 \times 10 = 5776000$

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Subject:

Date:

Ans. to the Ques. No-6

The number of different answers that are possible
There are 4 choices for 1 question,
and we have 10 ques. ~~on~~ with no skips,
There are 4^{10} ways.

In Order to insure that 3 answer sheets are identical were need every possibility filled twice and then one more or,

$2 \times 4^{10} + 1 = 2097153$ students

Ans. to the Ques. 7

Student passed in history $= (H_P) = 75\%$
Students passed in mathematics $(M_P) = 65\%$
So,
failed in History $(H_F) = (100-73)\% = 25\%$
failed in Math $(M_F) = (100-65)\% = 35\%$

50% passed in both
35% failed in both
So, $H_P \cap M_P = 50\%$
$H_F \cap M_F = 35\%$

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Subject: Date:

Let x = total number of students

$n(H_P) = 0.75x$

$n(H_F) = 0.25x$

$n(M_P) = 0.65x$

$n(M_F) = 0.35x$

$n(H_P \cap M_P) = 0.50x$

$n(H_F \cap M_F) = 35$

Since

$\Rightarrow n(H_P \cup M_P) = n(H_P) + n(M_P) - n(H_P \cap M_P)$

$\Rightarrow n(H_P \cup M_P) = 0.75 + 0.65 - .50 = 0.90$

$$\Rightarrow \frac{n(H_P \cup M_P)}{N} = 0.90$$

$$\Rightarrow N = \frac{n(H_P \cup M_P)}{0.90}$$

Now $n(H_P \cup M_P) = N - n(H_F \cap M_F)$

$= N - 35$

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

$(0.10)N = 35$

$N = 350$

So the total number of students will be 350 (Ans)

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Ans. to the Ques. No-8

First we need to find the total number of possible outcomes → 780 - 299

= 481 (total)

So we have 481 possible outcome

Now we have to find the successful outcomes

We need to find 1 in,

3 digit, 2 digit, 1 digit

→ 1 in 3 digits = 0

because number range 300 to 780

→ 1 in 2 digits :-

311, 411, 511, 611, 711

∴ 5 numbers

→ 1 in 1 digit = 16 × 5 = 80

~~201~~

So Total successful outcomes = 0 + 5 + 80

= 85

So the possibility is $\frac{85}{481}$ = 0.1767

Ans.

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DATE:

9 a) $C(10,6)$

$= \frac{10!}{6!(10-6)!}$

$= 210$ ways

$P(6)$

$= \frac{6!}{2!4!}$

$= 15$ ways

By multiplication rule,

$210 \cdot 15$

$= 3150$ ways

b) let the four empty slot as 1 element,

then there are 7 slots

number of elements $= 1+2+4$

$= 7$

$P(7) = \frac{7!}{2!4!}$

$= 105$ ways

DATE:

10 a) A= the trainee receives message

$P(E \cap A) = 0.4 \cdot 0.6$
$= 0.24$

$P(H \cap A) = 0.5 \cdot 1$
$= 0.5$

$P(L \cap A) = 0.1 \cdot 0.8$
$= 0.08$

$P(A) = P(E \cap A) + P(L \cap A) + P(H \cap A)$
$= 0.24 + 0.08 + 0.5$
$= 0.82$

$\therefore 0.82$

b) A= the trainee receives message.
E= the trainee receives message via email

$$P(E|A) = \frac{P(E \cap A)}{P(A)}$$

$$= \frac{0.4 \cdot 0.6}{0.82}$$

$$= \frac{12}{41}$$

DATE:

11 let A be the event of light truck.

let A' be the event of car

let B_1 be the event of fatal accident

let B_2 be the event of accident not involved fatality.

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

$P(B_1|A') = \frac{20}{100\,000}$, $P(B_1|A) = \frac{25}{100\,000}$

$$P(A|B_1) = \frac{P(B_1|A)\,P(A)}{P(B_1|A)\,P(A) + P(B_1|A')\,P(A')}$$

$$= \frac{\left(\frac{25}{100000}\right)(0.4)}{\left(\frac{25}{100000}\right)(0.4) + \left(\frac{20}{100000}\right)(0.6)}$$

$$= 0.4545$$

$\therefore 0.4545$

DATE:

12 total number of letters $= 9$

total number of boxes $= 4$

Possible number of ways to put the letters into boxes without restriction :

$4^9 = 262144$ ways

Possible number of ways to put the letters into three boxes only :

$C(4,3) = 4$

$4 \times 3^9 = 78732$ ways

Possible number of ways to put the letters into two boxes only :

$C(4,2) = 6$

$6 \times 2^9 = 3072$ ways

Possible numble of ways to put the letters in one box only :

$C(4,1) = 4$ ways

$\therefore$ Possible number of ways to place letters into 4 boxes with each box contain at least 1 letter :

$262144 - 78732 - 3072 - 4$

$= 180336$ ways