UNIVERSITI TEKNOLOGI MALAYSIA

SCHOOL OF COMPUTING

SEMESTER I 2020/2021

SECI1013-06 STRUKTUR DISKRIT (DISCRETE STRUCTURE)

ASSIGNMENT 2

GROUP 2

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Ref Date

Tutorial 2 (chapter 3)

Ahmad Mahyuddin Bin Md Said (A20EC0178)

1. 3 digit number either 2,3,4,5,6 or 7

a. How many numbers are there?

$\underline{6}\ \underline{6}\ \underline{6} = 6 \cdot 6 \cdot 6$

$= 216$

b. How many numbers are there if the digit are distinct?

$\underline{6}\ \underline{5}\ \underline{4} = 6 \cdot 5 \cdot 4$

$= 120$

c. How many numbers between 300 to 700 are only odd digit are allowed?

odd number = 3, 5, 7.

$\underline{4}\ \underline{6}\ \underline{3} = 4 \cdot 6 \cdot 3$

$= 72$

2. a) Men insist to sit next to each other, considering all men together and with the remaining 5 women we have total 6. So,

arrangements = $(6-1)!$

$= 5!$

Again, Men can be arranged among themselves in $5!$ ways.

Total ways of arrangements $(5! \times 5!)$

$= 14400$ ways.

b. The couple insisted to sit next to each other, Couples can be arranged among themselves in $2!$ ways.

So, total arrangements $(9-1)! \times 2!$

$= 80640$ ways.

c. Number of Men = 5

" " Women = 5.

Women can seat in $(5-1)! = 4! = 24$ ways.

Men can seat in between ~~5!~~ = ~~120 ways~~ $(5-1)! = 24$ ways

Total arrangements = $24 \times 120 + 24$

= ~~2880 ways~~.

$= 48$ ways.

Abiba Jumana (A20EC4009)

2. d) given,

Number of friends = 10

Total people can now considered as 11.

Anita and her husband can be arranged in 2! ways.

So, total ways = $11! \times 2! = 79833600$ ways.

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Ans. to the Ques. No. 3 :

(a)

There are 5 sprinters competing in 100 meter race. So the total no. of ways the sprinters can finish if there is no tie :

∴ In case of no tie = 5!

= 120.

(b)

Since, there is a tie and there are 5 sprinters. Hence, they can finish in 1st, 2nd, 3rd or 4th place.

Hence, no. of ways = $4! \times {}^5C_2$

= 240.

(c)

Since, there are 2 ties and 5 sprinters

Hence, they can finish in 1st, 2nd and 3rd positions.

Hence no. of ways = $3! \times {}^5C_2 \times {}^3C_2$

$= 180$.

AHMAD FARUQ BIN AZCHY
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No. _____
Date _____

4. A croissant shop has plain croissants, cherry croissants, chocolate croissant, almond croissants, apple croissants and broccoli croisants. How many are there to choose

a) a dozen croissants.

$n = 6$
$r = 12$

$$C = \frac{(n+r-1)!}{r!\,(n-1)!}$$

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

$$= 6\,188$$

Ans = 6188

b) Two dozen croissants with at least two of each kind?

2 dozens = 24
at least two of each kind = 6 × 2 = 12
r, remaining = 24 − 12 = 12
n = 6

$$C = \frac{(n+r-1)!}{r!\,(n-1)!}$$

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

$$= 6188$$

Ans = 6188

c) Two dozen croissant with at least five chocolate croissants and at least three almond croissants?

2 dozens = 24
at least 3 almond = 8
& 5 chocolate
r, remaining = 24 − 8 = 16
n = 6

$$C = \frac{(n+r-1)!}{r!\,(n-1)!}$$

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

$$= 20\,349$$

Ans = 20 349

Ahmad mahyuddin bin Md Sarid A20EC0178

5 a) 3 option = win , lose , tie

To win : 1) 2 win in first 4 game and 1 tie / win

2) 1 win in first 3 game and 3 tie / win

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

$= \frac{4!}{2!(2!)} \cdot \frac{3!}{1!(2!)} \cdot 2 : 6 \cdot 3 \cdot 2$

$= 36$

2) $= C(3,1) \cdot (4,3) \cdot 2^3 = \frac{3!}{1!(2!)} \cdot \frac{4!}{3!(1!)} \cdot 8$

$= 3 \cdot 4 \cdot 8$

$= 96$

$= (96 + 36)2$

$= 264$

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b) $2^{10} = 1024$

for first 10 round there are 1024 possible outcomes

264 outcomes will make it finish on the first round

$\therefore = 1024 - 264$
$= 760$

number of possible outcome if finish on 2nd 10 round $= 760 \cdot 264$

$= 200\,640$

c) not finish on first 10 round : 760
not finish on second 10 round = 760

Sudden death = 2 × 5 round
= 10

number of possible outcome if finish on sudden death $= 760 \cdot 760 \cdot 10$

$= 5776000$

Afifa Jumana (A20EC4009)

6. If all question must be answered and there is only one answer per question, then there are,

$4^{10} = 1048576$ different possible answer sheets

Minimum number of student that guarantee at least 3 answer sheets must be identical:

$(2 \times 1048576 + 1) = 2097153$ students.

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Ans. to the Ques. No. 7:

Given,

Passed in history $= 75\% = 0.75$

$\therefore$ Failed in history, $H' = 1 - 0.75 = 0.25$

Passed in Mathematics, $M = 65\% = 0.65$

$\therefore$ Failed " " , $M' = 1 - 0.65 = 0.35$.

Passed in both H and M $= 50\% = 0.5$

$\therefore$ Failed in " H and M $= 1 - 0.5 = 0.5$.

We know,

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

$$= 0.25 + 0.35 - 0.5$$

$$= 0.1$$

$$= 10\%$$

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When 10 students fail, total number is 100

" 35 " " , " " " $\frac{10 \times 35}{10}$

$= 350$

Ans: 350.

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8.

780.5 − 299.5 = 481

from 300 to 780 there are 481 numbers

~~east~~

containing num 1 : 300 − 400 = 19 numbers
401 − 500 = 19 numbers
501 − 600 = 19 "
601 − 700 = 19 "
701 − 780 = 17 "

total = 93

probabity that the number have 1 as at least one digit number = $13/481$ = 0.1933471933

AHMAD FARHAN BIN AZLAN
A20EC0005

No.
Date

9. Two blue and four yellow cars are to be parked in a row of 10 parking lots. Assume that cars of the same colour are not distinguishable and the parking lots are chosen at random

a. In how many ways can the cars be parked in the parking lots?

parking lots = 10
blue cars = 2
yellow cars = 4
empty = 4

$$\frac{10!}{2!\,4!\,4!} = 3150$$

Ans = 3150

b. In how many ways can the cars be parked so that the empty lots are next to each other? Find the probability that the empty lots are next to one another?

$$\frac{6! \times 7}{2!\,4!} = 105$$

$$P(A) = \frac{105}{3150}$$

$$= 0.033$$

Ans = 0.033

10. a) let,

the trainee receives the message = A.

$\therefore P(A) = (0.4 \times 0.6) + (0.1 \times 0.8) + (0.5 \times 1)$

$= 0.24 + 0.08 + 0.5$

$= 0.82.$ (Ans).

b). ~~ee~~ let,

receives via email = B.

Receiving message = C.

probabilities that he uses email ~~=0.4~~ $P(B) = 0.4$.

Trainee receives message if the coach uses email

$P(C|B) = 0.6$, $P(A) = 0.82$.

$\therefore P(B|C) = \frac{P(C|B) \times P(B)}{P(A)} = \frac{0.4 \times 0.6}{0.82}$

$= 0.2926$

$= 29.26\%$ (Ans).

Ans. to the Ques. No. 11:

Events

A = light trucks

A' = cars

B = Fatal accident

B' = Not Fatal accident.

ADIB BIN MORSHED

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$P(A) = 0.4$

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

$P(B/A') = \frac{20}{100,000} = 0.0002$

$P(B^*/A) = \frac{25}{100,000} = 0.00025$

In case of a fatal light truck incident,

$$P(A/B) = \frac{P(B^*/A) \times P(A)}{P(B/A') \times P(A') + P(B/A) \times P(A)}$$

$$= \frac{0.00025 \times 0.4}{0.0002 \times 0.6 + 0.00025 \times 0.4}$$

$$= 0.4545$$

$$= 45.45\%.$$

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A20 EC0005

No.

Date

12 There are 9 letters having different colours (red, orange, yellow, green, blue, indigo, velvet) and 4 boxes of different shapes (tetrahedron, cube, polyhedron, dodecahedron). How many ways are there to place these 9 letters into the 4 boxes such that each box contain of least 1 letter?

repitition allowed = 4^9
= 262144

2 choices per letter = 4×3^5
= 78732

To put all letter into one box 2 times = 4×1^5
= 4

∴ 262144 - 78732 + 4
= 183416

Ans = 183 416