ASSIGNMENT 2

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SECTION/COURSE CODE	**: [SECI1013] [01] – [DISCRETE STRUCTURE]**
LECTURER	**: [DR. RAZANA ALWEE]**
SESSION/SEMESTER	**: [2020/2021] - [01]**

Case Study Report submitted to School of Computing, Univerisiti Teknologi Malaysia in partial fulfilment to complete the SECI1013 Assignment for Semester 1 session 2020/2021

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1) a) _ _ _

ways = $6 \times 6 \times 6$

$= 216$

b) $\underline{6}\ \underline{5}\ \underline{4}$

ways = $6 \times 5 \times 4$

$= 120$

c) 3 _ _ : $1 \times 3 \times 3 = 9$

5 _ _ : $1 \times 3 \times 3 = 9$

ways = $9 + 9$

$= 18$

2) a) 5 mens and 5 womens

ways = $(6-1)! \times 5!$

$= 14400$

b) ways = $(9-1)! \times 2!$

$= 80\ 640$

c) 5 womens sit alternative $= (5-1)!$

$= 24$ ways

5 mens arrange in 5 gaps $= (5)!$

$= 120$ ways

ways = 24×120

$= 2880$ ways

d) ways = $11! \times 2!$

$= 79833600$

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3) a) ways = $5!$
$= 120$

b) Two sprinter tie = ${}^5C_2$
$= 10$ ways

ways = $4! \times 10$
$= 240$

c) 5 sprinter 2 tie = ${}^5C_2 \times {}^3C_2$
$= 30$

ways = $3! \times 30$
$= 180$

4) a) $n=6$, $r=12$

$C(6+12-1, 12) = C(17, 12)$

$= \frac{17!}{12!(17-12)!}$

$= 6188$

b) ways to chose plain croissants = 2
ways to chose cherry croissants = 2
ways to chose chocolate croissants = 2
ways to chose almond croissants = 2
ways to chose apple croissants = 2
ways to chose brocoli croissants = 2
ways to chose croissants with two each kind = 2+2+2+2+2+2
= 12

since ~~we know~~ first dozen croissants already picked up.

$n=6$, $r = 24-12$
$= 12$

$C(6+12-1, 12) = C(17, 12)$

$= \frac{17!}{12!(17-12)!}$

$= 6188$

c) ways to chose 5 chocolate croissants = 5
ways to chose 3 almond croissants = 3
ways to chose 5 chocolate croissants and 3 almond croissants = 8

since 8 croissants already picked up,

$n=6$, $r = 24-8$
$= 16$

$C(6+16-1, 16) = C(21, 16)$

$= \frac{21!}{16!(21-16)!}$

$= 20349$

5) a) 3 Options : Team 1 wins , Team 2 wins , tie

if round ends once it is impossible for a team to equal the number of scored by other team , 2 win with 1 additional tie/win or 1 win with 3 additional tie/win

2 wins among 4 games , $C(4,2) = \frac{4!}{2!(4-2)!}$
$= 6$

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

$\therefore$ 2 wins with 1 tie/win $= {}^4C_2 \times {}^3C_1 \times 2$
$= 36$

1 win and 3 tie/win $= {}^3C_1 \times {}^4C_3 \times 2^3$
$= 96$

$\therefore$ different scoring scenarios $= 2 \cdot (36 + 96)$
$= 264$

b) first round not settle ,

possible outcome of 10 penalty kicks $= 2^{10}$
$= 1024$

the possible outcome for game not settle in first round $= 1024 - 264$
$= 760$

$\therefore$ different scoring scenarios $= 760 \cdot 264$
$= 200\ 640$

c) first round not settle $= 760$

second round not settle $= 760$

sudden death $= 2 + 2 + 2 + 2 + 2$
$= 10$

$\therefore$ different scoring scenarios $= 760 \cdot 760 \cdot 10$
$= 5\ 776\ 000$

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b) possible answer sheet $= 4^{10}$
$= 1048576$

if pigeons = student, x
pigeonholes = 1048576

$$\frac{x-1}{1048576} + 1 = 3$$

$$x-1 = 2097152$$
$$x = 2097153$$

$\therefore$ minimum no of students that must be in the professor's class in order to guarantee that at least 3 answer sheets must be identical is 2097153

7) Student passed in History = 75%
Student passed in Mathematics = 65%
Student passed in both History & Mathematics = 50%
Student passed at leased one = 75% + 65% - 50%
= 90%
Student failed in both subject = 100% - 90%
= 10%

$\therefore \quad 35 \times \frac{100\%}{10\%} = 350$

$\therefore$ the no of candidates sit for exam = 350

8) total number integer in the set from 300 to 780 = 780 - 300 + 1
= 481

1 in 3 digits = 0
1 in 2 digits = 311, 411, 511, 611, 711
= 5 numbers

1 in 1 digits :
3 _ _ = 301, 310, 312, 313, 314, 315, 316, 317, 318, 319,
321, 331, 341, 351, 361, 371, 381, 391
= 18 numbers
4 _ _ = 18 numbers
5 _ _ = 18 numbers
6 _ _ = 18 numbers
7 _ _ = 701, 710, 712, 713, 714, 715, 716, 717, 718, 719, 721,
731, 741, 751, 761, 771
= 16 numbers.

Total = 0 + 5 + 4(18) + 16
= 93

probability = $\frac{93}{481}$
= 0.1935

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9) a) ways to park = ${}^{10}C_6$

= 210 ways

since 2 blue and 4 yellow = $\frac{6!}{2! \times 4!}$

= 15 ways

∴ ways = 210 × 15

= 3150

b) 2 1 4 3 2 1 [_ _ _]

ways = $\frac{7!}{2! \times 4! \times 1!} \times \frac{4!}{4!}$

= 105

since possible outcome = 3150

P(empty slot next to each other) = $\frac{105}{3150}$

= $\frac{1}{30}$

= 0.0333

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10) $P(\text{email}) = 0.4$

$P(\text{letter}) = 0.1$

$P(\text{handphone}) = 0.5$

$P(\text{receive} \mid \text{email}) = 0.6$

$P(\text{receive} \mid \text{letter}) = 0.8$

$P(\text{receive} \mid \text{handphone}) = 1$

a) $P(\text{receive}) = P(\text{receive} \mid \text{email})\, P(\text{email}) + P(\text{receive} \mid \text{letter})\, P(\text{letter}) +$
$P(\text{receive} \mid \text{handphone})\, P(\text{handphone})$

$= (0.6)(0.4) + (0.8)(0.1) + (1)(0.5)$

$= 0.82$

b) $P(\text{email} \mid \text{receive}) = 0.29268$

$$P(\text{receive} \mid \text{email}) = \frac{P(\text{receive} \cap \text{email})}{P(\text{email})}$$

$P(\text{receive} \cap \text{email}) = (0.6)(0.4)$

$= 0.24$

$$\therefore P(\text{email} \mid \text{receive}) = \frac{0.24}{0.82}$$

$= 0.29268$

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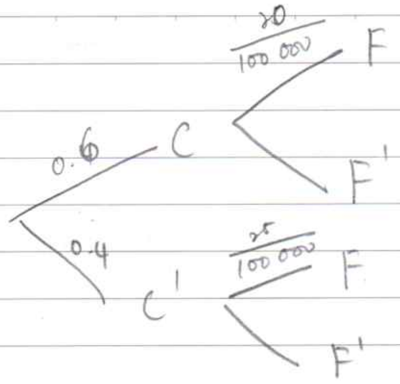
11) C - Cars

C' - Light truck

F = Fatal accident

F' = Not Fatal accident



$P(F|C) = \frac{20}{100\,000}$

$P(F|C') = \frac{25}{100\,000}$

$P(C') = 0.4$

$$P(C'|F) = \frac{P(F|C')\,P(C')}{P(F|C')\,P(C') + P(F|C)\,P(C)}$$

$$= \frac{\left(\frac{25}{100\,000}\right)(0.4)}{\left(\frac{25}{100\,000}\right)(0.4) + \left(\frac{20}{100\,000}\right)(0.6)}$$

$$= 0.4545$$

12) no of possible way can 9 letter into 4 boxes $= 4^9$

$= 262144$

let T = tetrahedron

C = cube

P = polyhedron

D = dodecahedron

if T/C/P/D no letter , $4 \times 3^9 = 78732$

if $T \cap C / T \cap P / T \cap D / C \cap P / C \cap D / P \cap D$ no letter , $6 \times 2^9 = 3072$

if $T \cap C \cap P / T \cap C \cap D / T \cap P \cap D / C \cap P \cap D$ no letter , $4 \times 1^9 = 4$

$\therefore$ ways to place 9 letters into 4 boxes such that each box contain at least one letter $= 262144 - 78732 + 3072 - 4$

$= 186480$