SECI 1013-03

STRUKTUR DISKRIT (DISCRETE STRUCTURE)

SEMESTER 1, 2020/2021

ASSIGNMENT 2

NAME	MATRIC NUMBER
AFIF HAZMIE ARSYAD BIN AGUS	A20EC0176
AHMAD AIMAN HAFIZI BIN MUHAMMAD	A20EC0177
MUHAMMAD IMRAN HAKIMI BIN MOHD SHUKRI	A20EC0213
NAYLI NABIHAH BINTI JASNI	A20EC0105

ANSWER:

1. a) $6 * 6 * 6 = 216$

   b) $P(6, 3) = \frac{6!}{(6-3)!} = 120$

   c) $\underline{1} * \underline{3} * \underline{3} = 9$
   $\underline{1} * \underline{3} * \underline{3} = 9$
   $9 + 9 = 18$ ways

2. a) 5! x (6-1)!
   120 ways x 120 ways = 14,400 ways

   b) The couple: P(2,2) = 2 ways
   All of them: (9-1)! Ways = 40,320 ways

   2 ways x 40,320 ways = 80, 640 ways.

   c) Men at round table: (5-1)! = 24 ways
   Women arrangement: 5! = 120 ways

   24 ways x 120 ways = 2,880 ways.

   d) Anita and Husband arrangement: P (2,2) = 2 ways
   All of them: 11! ways

   2 ways x 11! ways = 79,833,600 ways.

3. a) _ _ _ _ _ = 5 x 4 x 3 x 2 x 1 = 5! = 120 ways

   b) (_ _) _ _ _ = 1 x 4 x 3 x 2 x 1 = 1 x 4! = 24 ways

   c) (_ _) (_ _) _ = 2! x 2! x 3! = 24 ways

4. a) n = 6, r = 24

   (6 + 12 – 1)! / [12! x (6 – 1)!] = C (17, 12) = 6,188 ways

   b) 24 – 2 (6) = 12 croissants left

   n = 6, r = 12

   (6 + 12 – 1)! / [12! x (6 – 1)!] = C (17, 12) = 6,188

   c) 24 – 5 chocolate – 3 almond = 16 croissants left

   n = 6, r = 16

   (6 + 16 – 1)! / [16! x 5!] = C (21, 16) = 20,349

5. Penalty
   a. First 10 penalty

   5 penalty for each team

   Let n round = kick for Team A and Team B

   Team A:

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

   1 win among 3 rounds: $C(3,1) = \frac{3!}{2!(3-1)!} = 3$

   Remaining round:

   2 wins and 1 ties/wins: $C(4,2).C(3,1).2 = 36$

   1 win and 3 ties/wins: $C(3,1).C(4,1).2^3 = 96$

   Since there are 2 teams:

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

b. 20 penalty

For the first 10 kicks:
Total outcomes $= 2^{10} = 1024$ outcomes for each kick taken

From part a:
$1024 - 264 = 760$ scenarios not settled from first 10 penalty

Scenarios of kick settled in 10 penalty kicks $= 264$

Total number of scenarios $= 760.264 = 200,640$

c. More than 20
Total outcomes for 10 penalty: $2^{10} = 1024$ scenarios

Sudden-death shootout: 2 possibilities in each round (win or tie)
$= 5$ rounds of penalty

Game not settle in 10 penalty kick $= 760$ scenarios

Total scenarios $= 760 \,.\, 760 \,.\, 10 = 5,776,000$

6. 10: questions 4: answer choices

$10\ x\ 4 = 40$ possible responds

$m = 3, k = 40, n = ?$

$n = k(m - 1) + 1$

$n = 40(3 - 1) + 1$

n, minimum number of students $= 81$.

7. $P(H) = 0.75, P(M) = 0.65, P(H \cap M) = 0.5$

   $P(H') = 0.25, P(M') = 0.35, P(H' \cup M') = 0.5$

$$\frac{35\ candidates}{Total\ candidates, x} = P(H' \cap M')$$

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

   $0.5 = 0.25 + 0.35 - P(H' \cap M')$

   $0.1 = P(H' \cap M')$

$$\frac{35\ candidates}{Total\ candidates, x} = 0.1$$

   Total candidates, $x = 35 / 0.1 = 350$ candidates.

8. Number 1 at least one digit

   $C(9, 1) = \frac{9!}{1!\,(9-1)!} = 9$

   $\underline{5} * \underline{9} * \underline{1} = 45$

   Number 1 at least 2 digits

   $\underline{5} * \underline{1} * \underline{1} = 5$

   Total $= 45 + 5$

   $= 50$

   Total choices $= 780 - 300$

   $= 480$

   Probability $= \frac{50}{480}$

   $= 0.1042$

9. a) $P(10, 6) = \frac{10!}{(10-6)!} = 151200$

b) $1! * 4! * 5! = 2880$

$2! * 4! * 4! = 1152$

$3! * 4! * 3! = 864$

$4! * 4! * 2! = 1152$

$5! * 4! * 1! = 2880$

$6! * 4! = 17280$

$4! * 6! = 17280$

$\text{Total} = 2880 + 1152 + 864 + 1152 + 2880 + 17280 + 17280$

$= 43488$

$\text{Probability} = \frac{43488}{151200} = 0.2876$

10. a) $P(E) = 0.4 \;\; P(R \mid E) = 0.6$

$P(L) = 0.4 \;\; P(R \mid L) = 0.6$

$P(H) = 0.4 \;\; P(R \mid H) = 0.6$

$P(R) = P(R \mid E) \bullet P(E) + P(R \mid L) \bullet P(E) + P(R \mid H) \bullet P(H)$

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

$P(R) = 0.82$

b) Email, Letter and Handphone are independent event

So, $P(E \cap R) = P(E) \bullet P(R) = (0.4)(0.82) = 0.328$

$P(E \mid R) = P(E \cap R) / P(R) = 0.328 / 0.82 = 0.4$

11. T = Light Trucks F = Fatality
C = Car

$P(F \mid C) = 0.0002 \quad P(F|T) = 0.00025$

$P(T \mid F) = ?$

$$P(T \mid F) = \frac{P(F \mid T).P(T)}{P(F \mid T).P(T)+P(F \mid C).P(C)}$$

$$= \frac{0.00025(0.4)}{0.00025(0.4)+0.0002(0.6)}$$

$$P(T \mid F) = \frac{5}{11}$$

12. Total ways without restrictions: $4^9 = 262, 144$ ways.

Disallowed ways (If all the letters are filled in 3 boxes only): 4 ways x 3^9 = 78, 732 ways.

Disallowed ways (If all the letters are filled in 2 boxes only): 6 ways x 2^9 = 3, 072 ways.

Disallowed ways (If all the letters are filled in 1 box only): 4 ways x 1^9 = 4 ways.

Inclusion – Exclusion.

262,144 – (78,732 - 3,072 - 4) = 186, 488 ways.