



SECI 1013-03

STRUKTUR DISKRIT (DISCRETE STRUCTURE)

SEMESTER 1, 2020/2021

ASSIGNMENT 2

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ANSWER:

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

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

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

$\underline{1} * \underline{3} * \underline{3} = 9$

$9 + 9 = 18 \text{ ways}$

2. a) $5! \times (6-1)!$

$120 \text{ ways} \times 120 \text{ ways} = 14,400 \text{ ways}$

b) The couple: $P(2,2) = 2 \text{ ways}$

All of them: $(9-1)! \text{ Ways} = 40,320 \text{ ways}$

$2 \text{ ways} \times 40,320 \text{ ways} = 80,640 \text{ ways.}$

c) Men at round table: $(5-1)! = 24 \text{ ways}$

Women arrangement: $5! = 120 \text{ ways}$

$24 \text{ ways} \times 120 \text{ ways} = 2,880 \text{ ways.}$

d) Anita and Husband arrangement: $P(2,2) = 2 \text{ ways}$

All of them: $11! \text{ ways}$

$2 \text{ ways} \times 11! \text{ ways} = 79,833,600 \text{ ways.}$

3. a) $----- = 5 \times 4 \times 3 \times 2 \times 1 = 5! = 120$ ways

b) $(_)_ _ = 1 \times 4 \times 3 \times 2 \times 1 = 1 \times 4! = 24$ ways

c) $(_)(_)_ = 2! \times 2! \times 3! = 24$ ways

4. a) $n = 6, r = 24$

$$(6 + 12 - 1)! / [12! \times (6 - 1)!] = C(17, 12) = 6,188 \text{ ways}$$

b) $24 - 2(6) = 12$ croissants left

$$n = 6, r = 12$$

$$(6 + 12 - 1)! / [12! \times (6 - 1)!] = C(17, 12) = 6,188$$

c) $24 - 5 \text{ chocolate} - 3 \text{ almond} = 16$ croissants left

$$n = 6, r = 16$$

$$(6 + 16 - 1)! / [16! \times 5!] = C(21, 16) = 20,349$$

5. Penalty

a. First 10 penalty

5 penalty for each team

Let n round = kick for Team A and Team B

Team A:

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

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

Remaining round:

$$2 \text{ wins and 1 ties/wins: } C(4, 2) \cdot C(3, 1) \cdot 2 = 36$$

$$1 \text{ win and 3 ties/wins: } C(3, 1) \cdot C(4, 1) \cdot 2^3 = 96$$

Since there are 2 teams:

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

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 = $760 \cdot 264 = 200,640$

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 = $760 \cdot 760 \cdot 10 = 5,776,000$

6. 10: questions 4: answer choices

$10 \times 4 = 40$ possible responds

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

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

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

n , minimum number of students = 81.

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

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

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

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

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

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

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

$$\text{Total candidates, } x = 35 / 0.1 = 350 \text{ candidates.}$$

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

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

$$\text{Total} = 45 + 5$$

$$= 50$$

$$\text{Total choices} = 780 - 300$$

$$= 480$$

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

$$= 0.1042$$

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

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

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

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

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

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

$$6! * 4! = 17280$$

$$4! * 6! = 17280$$

$$\begin{aligned} \text{Total} &= 2880 + 1152 + 864 + 1152 + 2880 + 17280 + 17280 \\ &= 43488 \end{aligned}$$

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

$$10. \quad a) \quad P(E) = 0.4 \quad P(R | E) = 0.6$$

$$P(L) = 0.4 \quad P(R | L) = 0.6$$

$$P(H) = 0.4 \quad P(R | H) = 0.6$$

$$P(R) = P(R | E) \cdot P(E) + P(R | L) \cdot P(L) + P(R | H) \cdot P(H)$$

$$P(R) = (0.6)(0.4) + (0.6)(0.4) + (0.6)(0.4)$$

$$P(R) = 0.82$$

$$b) \quad \text{Email, Letter and Handphone are independent event}$$

$$\text{So, } P(E \cap R) = P(E) \cdot P(R) = (0.4)(0.82) = 0.328$$

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

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

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

$$P(T | F) = ?$$

$$\begin{aligned} P(T | F) &= \frac{P(F | T).P(T)}{P(F | T).P(T) + P(F | C).P(C)} \\ &= \frac{0.00025(0.4)}{0.00025(0.4) + 0.0002(0.6)} \end{aligned}$$

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

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

Disallowed ways (If all the letters are filled in 3 boxes only): $4 \text{ ways} \times 3^9 = 78,732$ ways.

Disallowed ways (If all the letters are filled in 2 boxes only): $6 \text{ ways} \times 2^9 = 3,072$ ways.

Disallowed ways (If all the letters are filled in 1 box only): $4 \text{ ways} \times 1^9 = 4$ ways.

Inclusion – Exclusion.

$$262,144 - (78,732 - 3,072 - 4) = 186,488 \text{ ways.}$$