UTM
UNIVERSITI TEKNOLOGI MALAYSIA

SCHOOL OF COMPUTING
Faculty of Engineering

ASSIGNMENT 2

DISCRETE STRUCTURE-07

GROUP-01:

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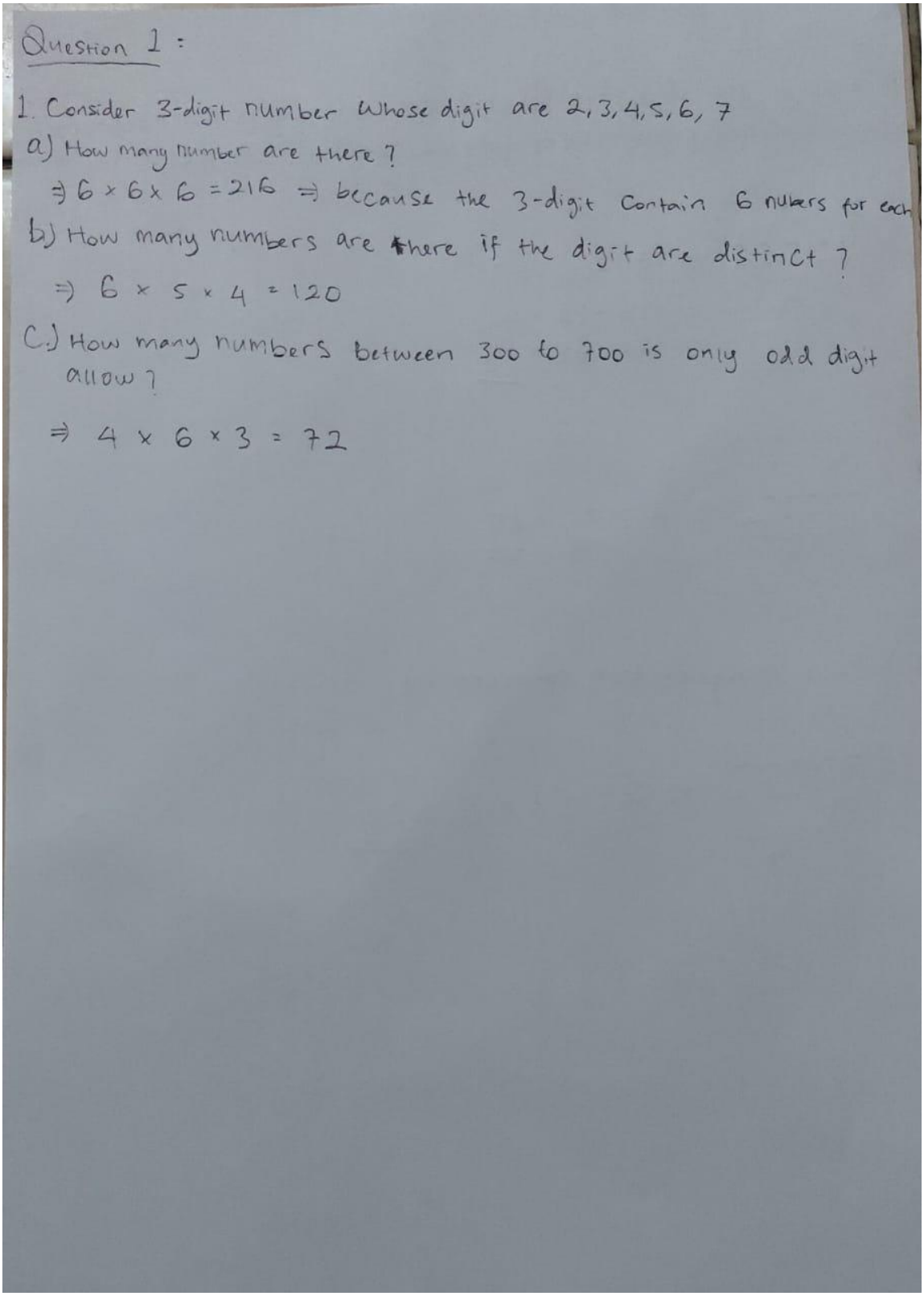
Q1:



Question 1 :

1. Consider 3-digit number whose digit are 2, 3, 4, 5, 6, 7

a) How many number are there ?

⇒ 6 × 6 × 6 = 216 ⇒ because the 3-digit Contain 6 nubers for each

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

⇒ 6 × 5 × 4 = 120

C.) How many numbers between 300 to 700 is only odd digit allow ?

⇒ 4 × 6 × 3 = 72

Q2:

Question 2

12 person , 6 men 6 women

a) Men sits next to each other

$(6-1)! \times 6! \cdot 5!6!$

$= 86400$ ways

b) The couple sits next to each other

$(10-1)! \times 2! = 9!2!$

$= 725760$ ways

c) Men and women sit in alternate ~~seat~~

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

$= 86400$ ways

d) In a row, Anita and her husband ~~sits~~ stands together.

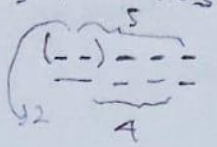
~~11!2!~~ $11!2! = 79833600$ ways

Q3:

Question 3.

In a school sport day, five sprinters are competing a 100 meter race. How many ways are there for the sprinter to finish

a.) If no ties :

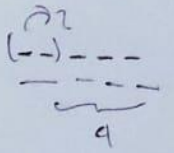


$\Rightarrow 5! - (2! \times 4!)$

$= 120 - (2 \times 24)$

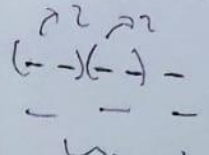
$= 120 - 48 = 72$

b.) two ties :



$\Rightarrow 2! \times 4! = 48$

c.) two group of two sprinters tie



$\Rightarrow 2! \times 2! \times 3! = 24$

$2 \quad 2 \quad 6$

Q4:

Question 4

6 types of croissants

a) A dozen croissants

$n = 6 \quad r = 12$

$C(n+r-1, r)$

$C(6+12-1, 12) = \frac{17!}{12!(17-12)!}$

$C(17, 12) = 6188$ ways

b) Two of each kind, two dozen

$n = 6, \quad r = (2 \times 12) - (6 \times 2)$

$= 12$

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

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

$C(17, 12) = 6188$ ways

c) 5 chocolates and 3 almonds

$n = 6, \quad r = (12 \times 2) - (5+3) = 16$

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

$= 20349$ ways

Q5:

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Q5.

a) ~~C(4,2)~~

if a team wins 2 games among 4 games

$C(4,2) = 4C_2 = 6$

if a team wins 1 game among 3 games

$C(3,1) = 3C_1 = 3$

2 wins and 1 ties or wins $= C(4,2) \times C(3,1) \times 2 = 36$.

1 wins and 3 ties or wins $= C(3,1) \times C(4,3) \times 2 \times 2 \times 2 = 96$

So:

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

b) if 10 penalty kicks are executed we have $= 1024$

Unsetted games $= 1024 - 264 = 760$

So first game $= 760$ second game $= 264$

Scenarios $= 760 = 200640$

c) A wins, B wins or a tie

first round $= 760$ second round $= 760$

for shootout the game was settled so the scenarios are $= 2 = 10$

So:

final scenario $= 10 = 5776000$

~~a) Receiving probability $= \sum P \cdot P_5 = 0.4 \times 0.6 + 0.7 \times 0.8 + 0.5 \times 0.7$~~

~~$= 0.24 + 0.56 + 0.35$~~

~~$= 0.82$~~

~~b) $P(B/A) =$~~

Q6 & Q7:

Question 6

Total number of questions = 10
Total number of answer choices = 4

Minimum number of students to guarantee = 3 identical answer sheets

$3 \times 4^{10} = 3145728$

Question 7

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

$P(H \cup M) = 0.75 + 0.65 - 0.5$
$= 0.9$

$1 - 0.9 = 0.1$
10% = 35 failed
x = total student

$10\% \times x = 35$
$x = 350$
Total student is 350.

Q8:

Question 8:

An integer from 300 through 780, inclusive is to be chosen at random, find the probability that the number is chosen will have 1 as at least one digit.

Total = 780 − 299
= 481

finding the successfull outcomes:

⇒ 1 in 3-digit = 0 because if 111 not include in the integer 300-780

1 in 2-digit = 5 (311, 411, 511, 611, 711)

1 in 1-digit =

range 300 − 400:

301, 310, 312, 313, 314, 315, 316, 317, 318, 319, 321, 331, 341, 351, 361, 371, 381, 391 ⇒ 18

- range 400 − 500 :

401, 410, 412, ..., 491 ⇒ 18

- range 500 − 600 :

501, 510, 512, ..., 591 = 18

- range 600 − 700 :

601, 610, 612, ..., 691 = 18

total = (18 × 4) + 16
= 72 + 16
= 88

- range 700 − 780 :

701, 710, 712, 713, 714, 715, 716, 717, 718, 719, 721, 731, 741, 751, 761, 771 ⇒ 16

Total the successfull outcomes = 0 + 5 + 88
= 93

$$\text{Probability} = \frac{\text{number of successfull outcomes}}{\text{total number of possible outcomes}}$$

$$= \frac{93}{481} = 0.193$$

Q9:

Question 9 :

Two blue and four yellow cars are be parked in a row of 10 parking lots. Asume that cars of the same color 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?

$\Rightarrow {}^{10}C_2 + {}^{8}C_4$

$\Rightarrow \frac{10!}{(10-2)!\,2!} + \frac{8!}{(8-4)!\,4!}$

$\Rightarrow \frac{5\cancel{10}\cdot 9\cdot \cancel{8!}}{\cancel{8!}\ \cancel{2!}} + \frac{\cancel{2}\ \cancel{8}\ \cancel{6}^{3}\cdot 5\cdot \cancel{4!}}{\cancel{4!}\ \cancel{4}\ \cancel{3}\cdot \cancel{2!}}$

$\Rightarrow 45 + 70 = 115$

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

$\Rightarrow {}^{6}C_2 + {}^{4}C_4 = 16$

$\Rightarrow \frac{6!}{(6-2)!\,2!} + \frac{4!}{(4-4)!\cdot 4!}$

$\Rightarrow \frac{\cancel{3}\ 6\cdot 5\cdot \cancel{4!}}{\cancel{4!}\cdot \cancel{2!}} + \frac{\cancel{4!}}{0!\cdot \cancel{4!}}$

$\Rightarrow 15 + 1 = 16.$

$\therefore 115 - 16 = 99 \Rightarrow$ empty lots are next to each other

the probability $\Rightarrow \frac{99}{115} = 0.861$

Q10:

Q10:

a) Receiving probability $= \sum P_i P_x = 0.4 \times 0.6 + 0.1 \times 0.8 + 0.5 \times 1$

$= 0.24 + 0.08 + 0.5$

$= 0.82$

b) ~~$P(B/A) = 0.32$~~

$P(A) = \frac{6}{32} = \frac{1}{6}$ $\quad P(A \cup B) = \frac{1}{36}$

$P(B) = 1 - P(A) = \frac{1}{12}$

$P(A \cap B) = P(A) + P(B) - P(A \cup B)$

$= \frac{1}{6} + \frac{1}{12} - \frac{1}{36}$

$= \frac{2}{9}$

$P(B/A) = \frac{P(A \cap B)}{P(A)} = \frac{\frac{2}{9}}{\frac{1}{6}} = 1.3$

Q11:

Q11.

A: Light truck A': Cars B: Fatal Accident B': Not a Fatal Accident

$P(A) = 0.4$

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

$P(A|B) = P(B|A)P(A) / P(B|A)P(A) + P(B|A')P(A')$

$P(B|A) = 1 - P(A|B)$

$= 0.4545$

$= 45.45\%$

So the probability the accident involved a light truck is 45.45%

Q12:

Q12:

Total number of letters = 9
Total number of boxes = 4

The possible number of ways without restriction =
$4^9 = 262144$

put the letters in 2 boxes the we have
4 choices for which box the letter get into
and two choices per letter
$4 \times 3^9 = 78732$
$4 \times 1^9 = 4$

The numbers of allow assignments of letters to boxes
$262144 - 78732 + 4 = 183416$.