IN SLIDE EXERCISE FOR CHAPTER 3

GROUP 5

SECTION 03 - SEM 1, 2024/2025

SECI1013 *(DISCRETE STRUCTURE)*

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DATE SUBMITTED : 21ST NOVEMBER 2024

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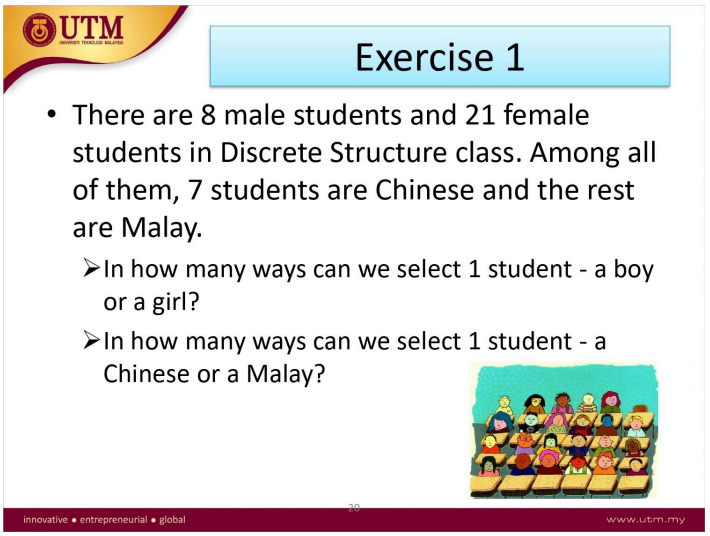
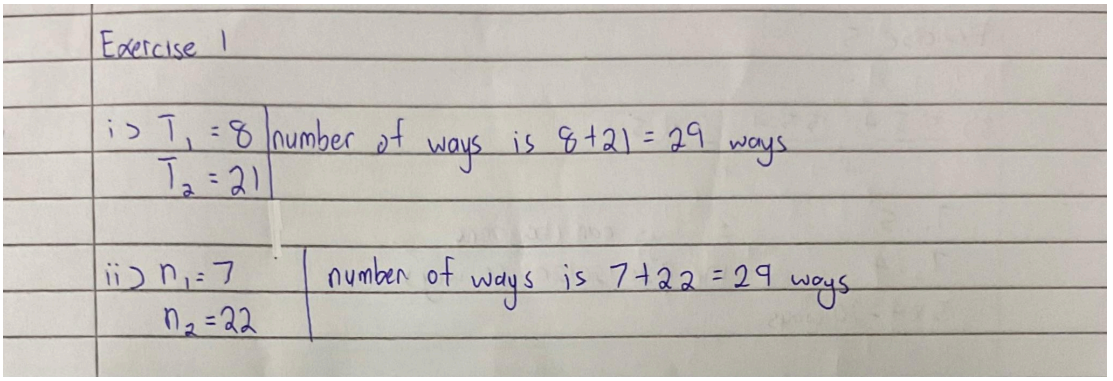
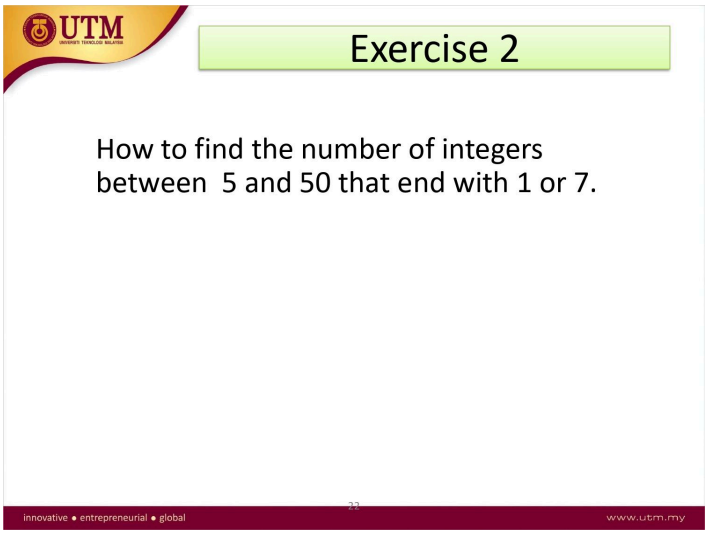
" Defining boundaries, expanding possibilities."

PART 1



ANSWER:

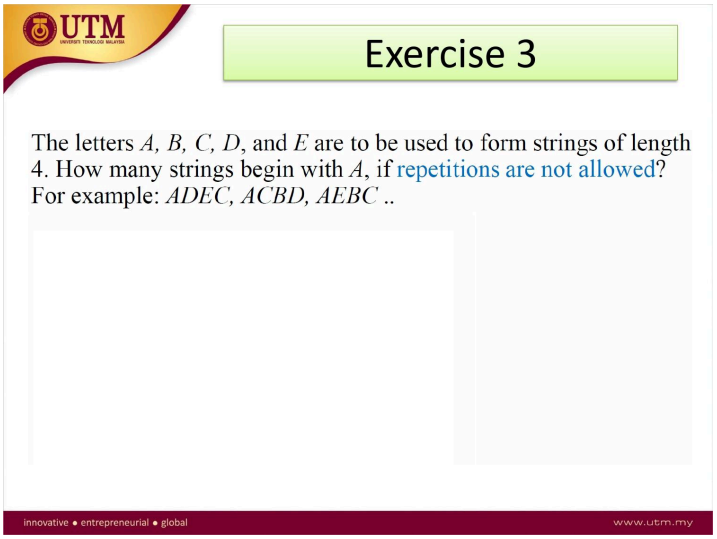




ANSWER:

Integers end with 1 = {11, 21, 31, 41} = 4
Integers end with 7 = {7, 17, 27, 37, 47} = 5

Number of integers between 5 and 50 that end with 1 or 7 = 4 + 5
= 9 ways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Exercise 3
The letters A, B, C, D, and E are to be used to form strings of length 4. How many strings begin with A, if repetitions are not allowed?
For example: ADEC, ACBD, AEBC ..
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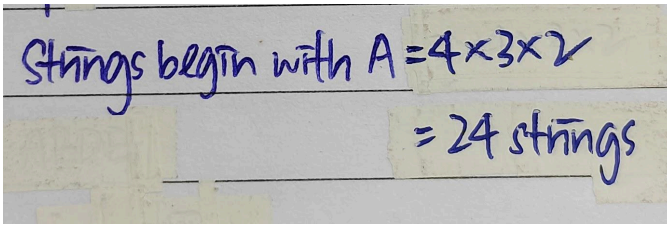
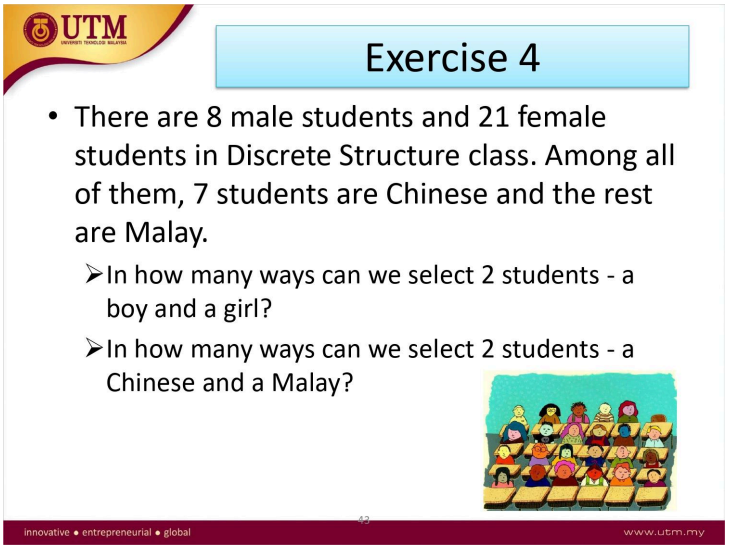
ANSWER:


Strings begin with A = 4 x 3 x 2
= 24 strings



ANSWER:

Male=8 Female=21
Chinese=7 Malay=22

a) T1=8, T2=21
Number of ways; 8 x 21 = 168

b) T1=7, T2=22
Number of ways; 7 x 22 = 154

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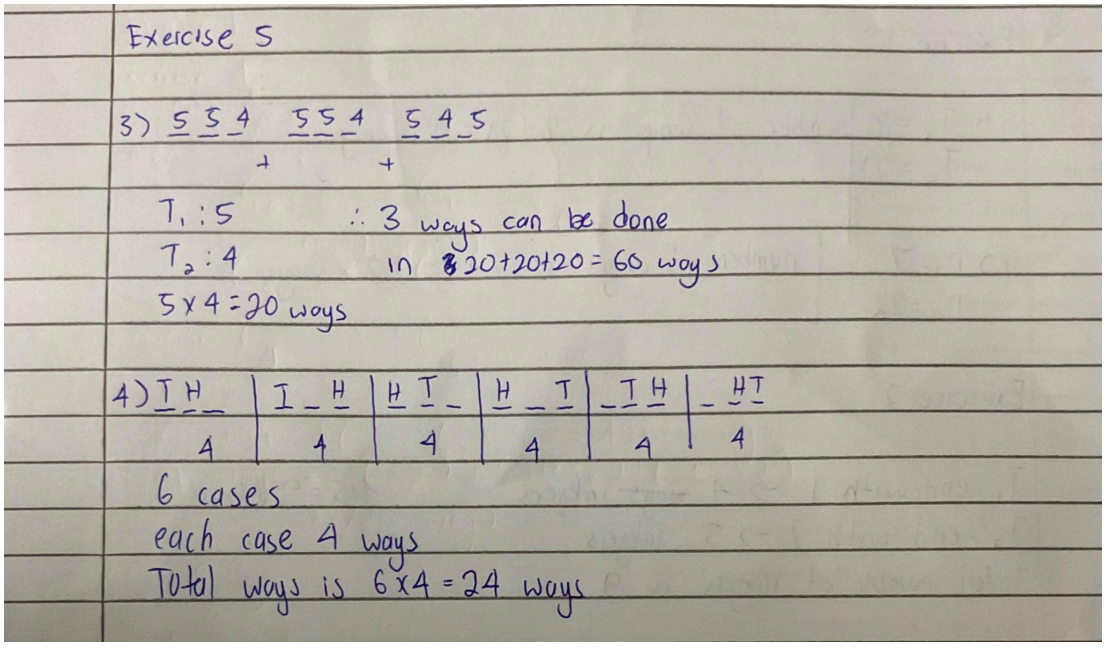
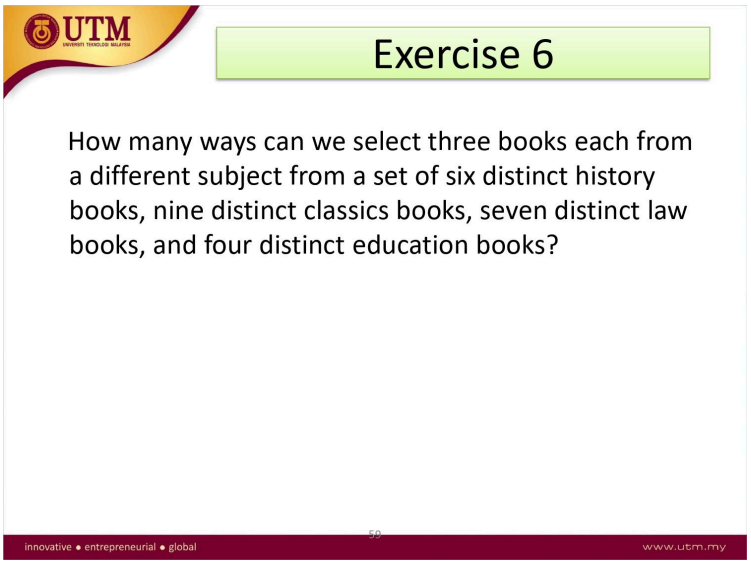
Exercise 5

A six-person committee composed of Aina, Wan, Chan, Tan, Syed and Helmi is to be selected to hold as a chairperson, secretary, and treasurer.

3. In how many ways can this be done if Syed must hold one of the position?
4. In how many ways can this be done if Tan and Helmi must hold any position?

ANSWER:





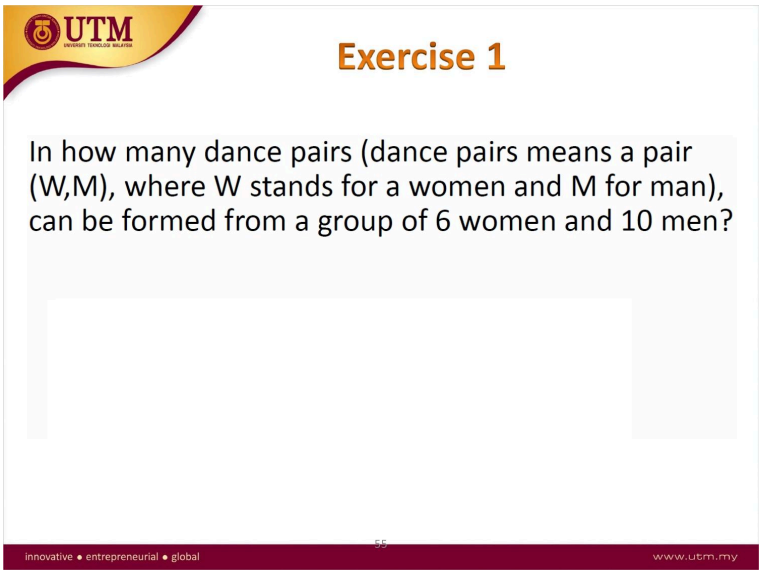
ANSWER:

History book = 6
Classic book = 9
Law book = 7
Education book = 4

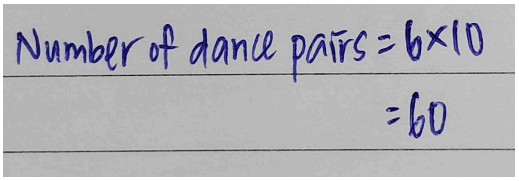
Ways to select three books from different subject:

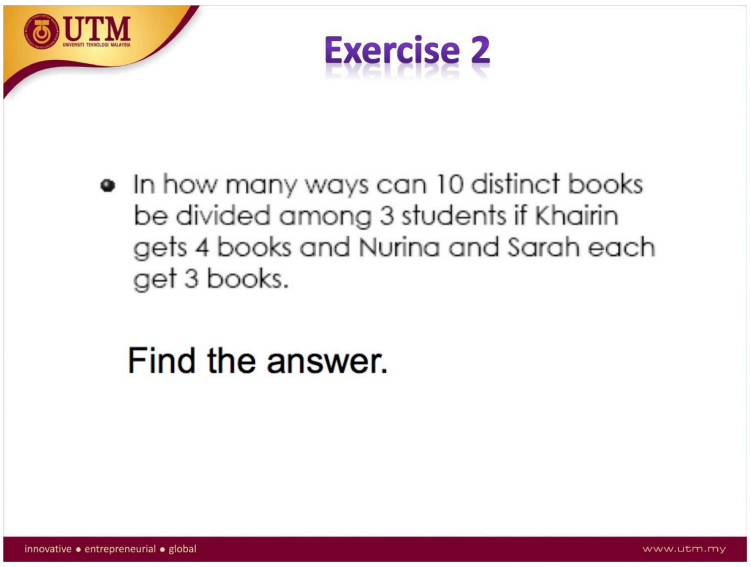
$(6 \times 9 \times 7) + (6 \times 9 \times 4) + (9 \times 7 \times 4) + (6 \times 7 \times 4)$
$= 378 + 216 + 252 + 168$
$= 1014$ ways

PART 2



ANSWER:





ANSWER:

n=10, n1=6, n2=3, n3=3

$P(10) = \frac{10!}{6!3!3!} = 4200$

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Exercise 3

- In how many ways can five people A, B, C, D, and E be seated around a circular table if

a) A and B must sit next to each other

b) A and B must not sit next to each other

c) A and B must be together and CD must be together

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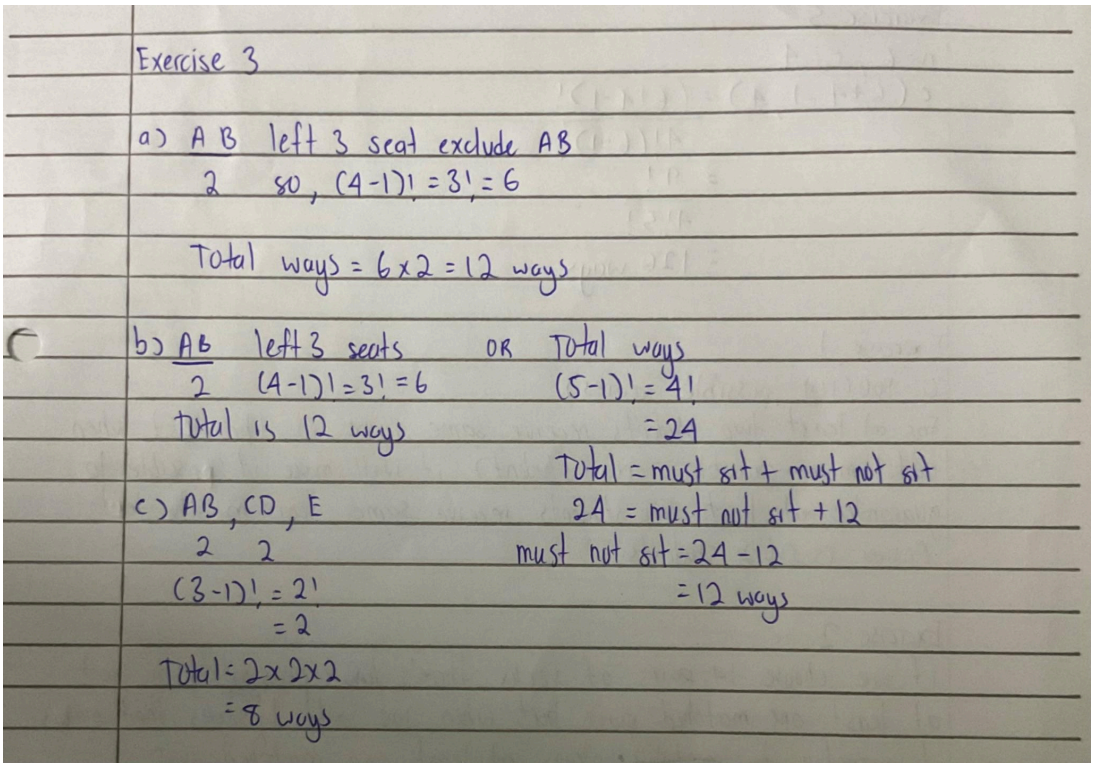
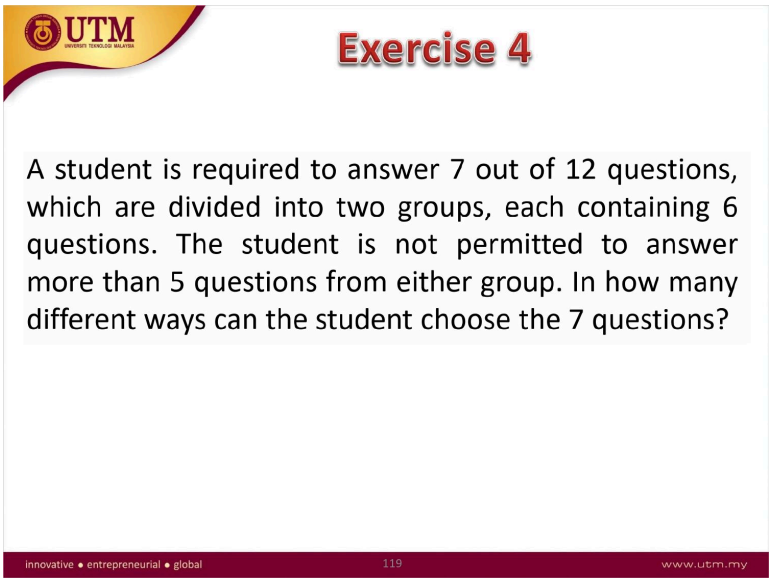
ANSWER:





ANSWER:

To answer 5 questions from Group 1 and 2 question from Group 2:

$$\left(\frac{6!}{5!(6-5)!}\right)\left(\frac{6!}{2!(6-2)!}\right) = 90 \text{ ways}$$

To answer 4 questions from Group 1 and 3 question from Group 2:

$$\left(\frac{6!}{4!(6-4)!}\right)\left(\frac{6!}{3!(6-3)!}\right) = 300 \text{ ways}$$

To answer 3 questions from Group 1 and 4 question from Group 2:

$$\left(\frac{6!}{3!(6-3)!}\right)\left(\frac{6!}{4!(6-4)!}\right) = 300 \text{ ways}$$

To answer 2 questions from Group 1 and 5 question from Group 2:

$$\left(\frac{6!}{2!(6-2)!}\right)\left(\frac{6!}{5!(6-5)!}\right) = 90 \text{ ways}$$

Total different ways for the student to choose the 7 questions = 90 + 300 + 300 + 90
= 780 ways

Exercise 5

There is a box containing identical blue, green, pink, yellow, red and dark blue balls. In how many ways we can select 4 balls?

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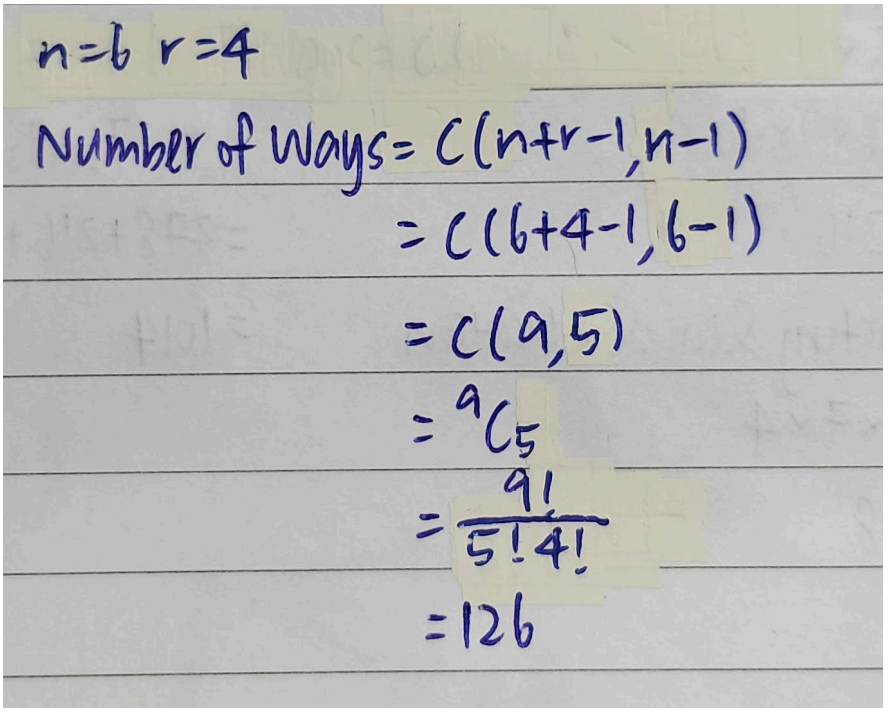
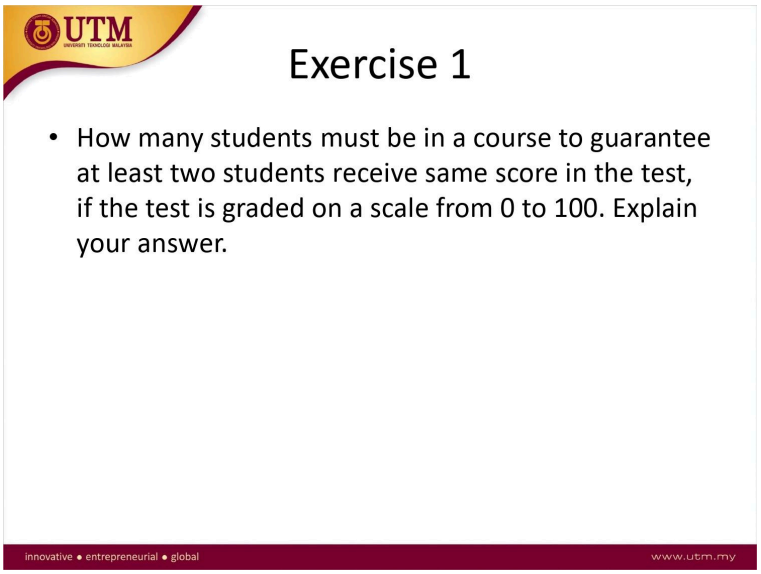
ANSWER:



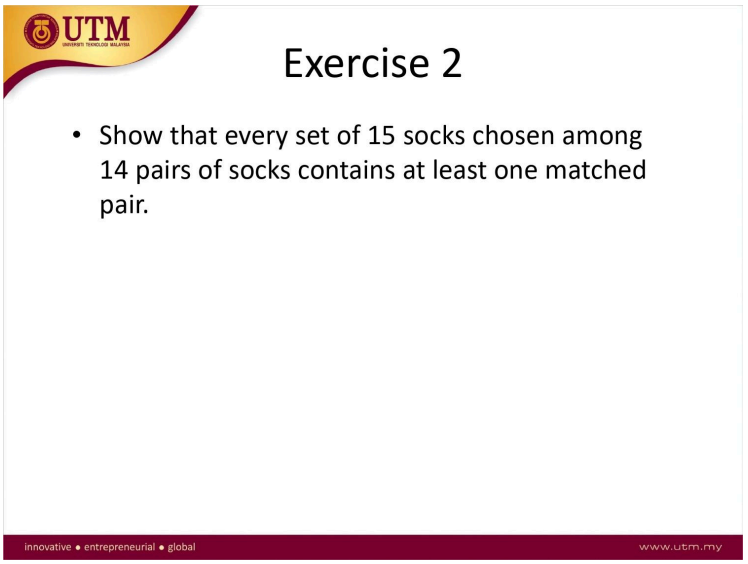
PART 3



ANSWER:

Pigeon (n) = number of students?
Pigeonhole (m) = 101 (grades)
k = 2

$n = m(k-1) + 1 = 101(2-1) + 1 = 102$

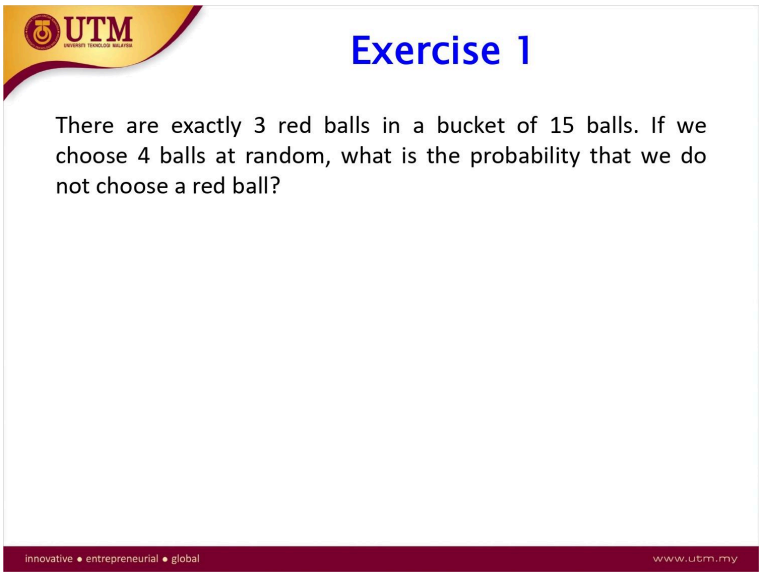


ANSWER:

n=minimum number of socks to guarantee to get at least one matched pair of socks.
m=14 pairs of socks
k=2(one matched pair of socks)
n=m(k-1)+1
n=14(2-1)+1=15

If we choose 14 pairs of socks there's a low possibility to get at least one matched pair but when we add 1 pair of socks that makes it guaranteed to contain at least one matched pair of socks. So, 15 pairs of socks will have at least one matched pair of socks.

PART 4



ANSWER:

Total balls = 15
Total balls not including red ball = 12
Balls to be chosen = 4

The probability that we do not choose a red ball:

$$\frac{C(12,4)}{C(15,4)} = 0.36263736264$$

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Exercise 2

What is the probability that if a fair coin is tossed 6 times you will get,

i) Less than 2 heads

ii) At least 2 heads

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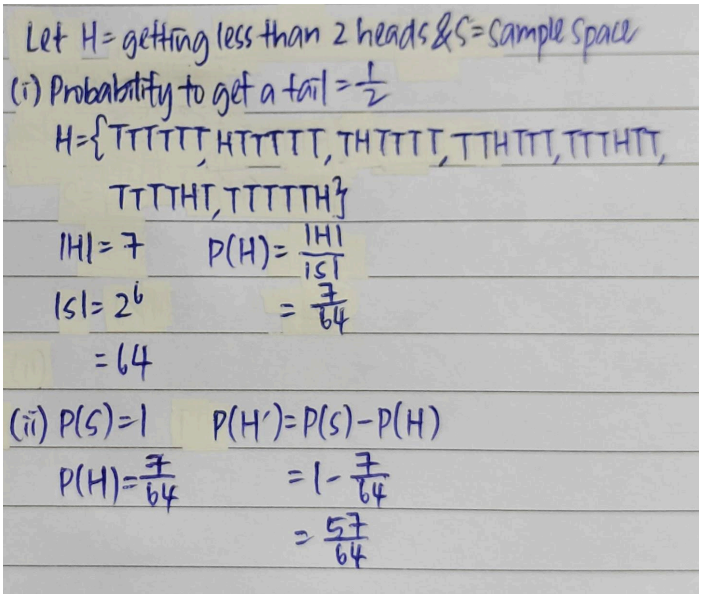
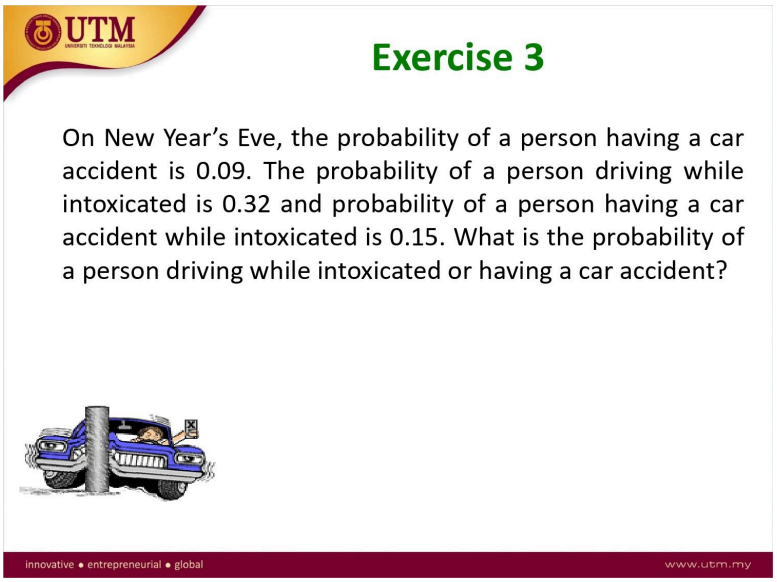
ANSWER:

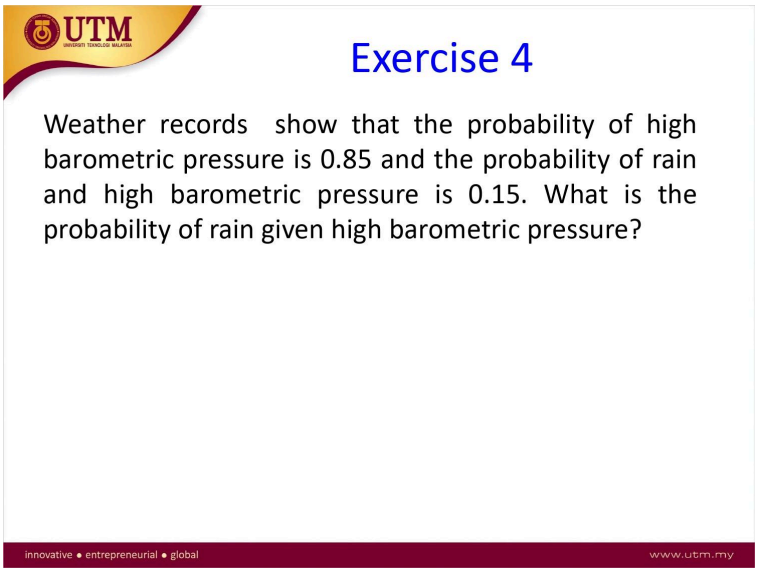




ANSWER:

Car accident = 0.09 (A)
Intoxicated = 0.32 (B)
Accident while intoxicated = 0.15 (C)

$P(A \cup B) = P(A) + P(B) - P(A \cap B) = 0.09 + 0.32 - 0.15 = 0.26$



ANSWER:

P(high barometric pressure)=0.85
P(rain and high barometric pressure)=0.15
P(rain given high barometric pressure)=P(rain and high barometric pressure)/P(high barometric pressure)
P(rain given high barometric pressure)=0.15/0.85=3/17

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Exercise 5

c) Given that I arrived late at work, what is the probability that it's rained that day?

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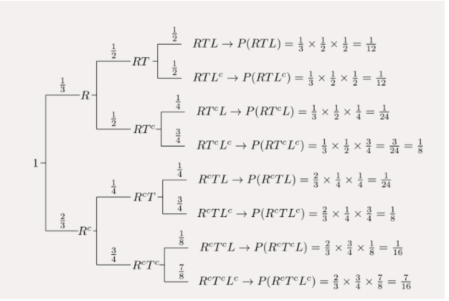
Let, R = event of rainy,
T = event of heavy traffic,
L = event of I'm late to work



ANSWER:

$$P(R|L) = \frac{P(R \cap L)}{P(L)}$$

$$P(R \cap L) = P(RTL) + P(RT^cL)$$
$$= \frac{1}{12} + \frac{1}{24}$$
$$= \frac{1}{8}$$

$$P(L) = P(RTL) + P(RT^cL) + P(R^cTL) + P(R^cT^cL)$$
$$= \frac{1}{12} + \frac{1}{24} + \frac{1}{24} + \frac{1}{16}$$
$$= \frac{11}{48}$$

$$P(R|L) = \frac{1/8}{11/48} = \frac{6}{11} \approx 0.545454$$

Exercise 6

- Hana, Amir and Dani write a program that schedule tasks for manufacturing toys.
- The table shows the percentage of code written by each person and the percentage of buggy code for each person.

	Coder		
	Hana	Amir	Dani
% of code	30	45	25
% of bugs	3	2	5

- Given that a bug was found, **find the probability that it was in the program code written by Dani.**

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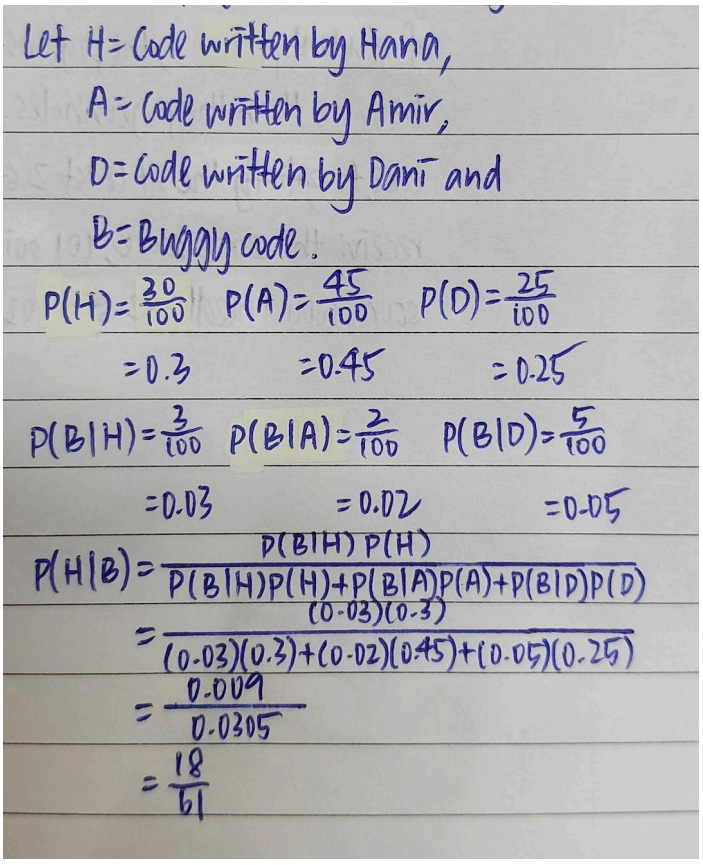
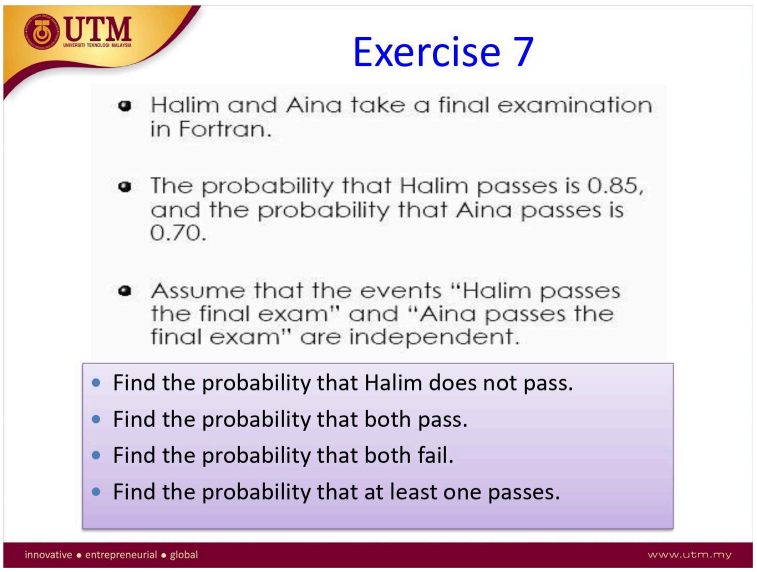
ANSWER:

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Exercise 7
Halim and Aina take a final examination in Fortran.
The probability that Halim passes is 0.85, and the probability that Aina passes is 0.70.
Assume that the events "Halim passes the final exam" and "Aina passes the final exam" are independent.
Find the probability that Halim does not pass.
Find the probability that both pass.
Find the probability that both fail.
Find the probability that at least one passes.
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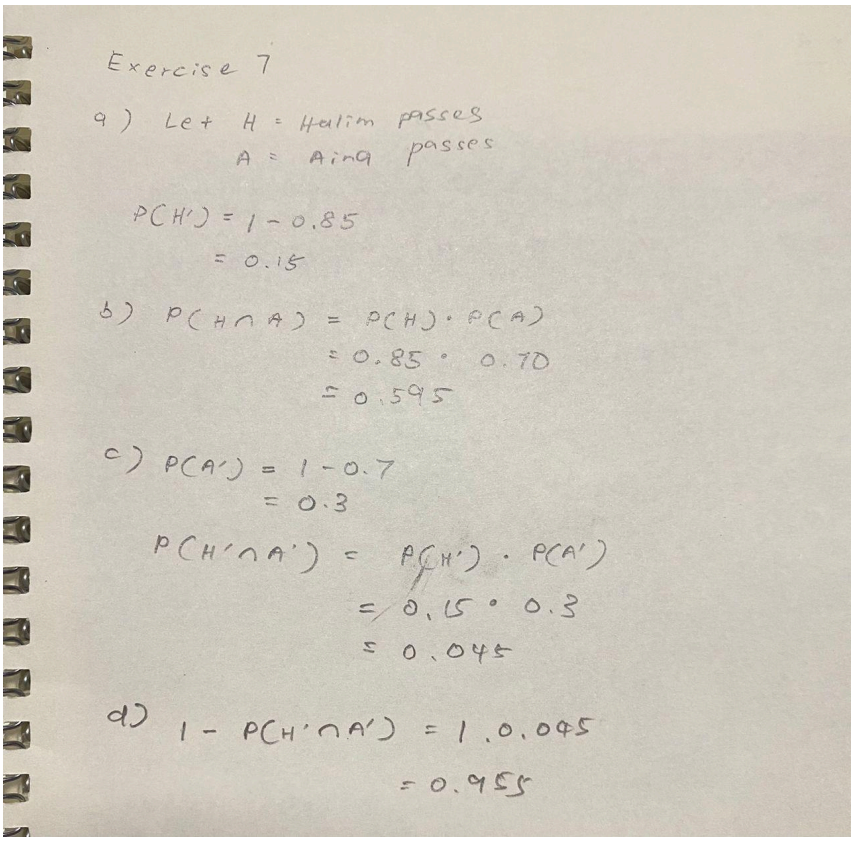
ANSWER:


Exercise 7
a) Let H = Halim passes
A = Aina passes
P(H') = 1 - 0.85
= 0.15
b) P(H ∩ A) = P(H) · P(A)
= 0.85 · 0.70
= 0.595
c) P(A') = 1 - 0.7
= 0.3
P(H' ∩ A') = P(H') · P(A')
= 0.15 · 0.3
= 0.045
d) 1 - P(H' ∩ A') = 1 - 0.045
= 0.955