ASSIGNMENT 2

CHAP 2

1\. i) a_n = the price of the stock at the end of the day

n = number of days

$a_0 = 50$

$a_1 = a_0(1.02)(0.98)$
$= a_0(0.9996)^1$

$a_2 = a_0(1.02)(0.98)(1.02)(0.98)$
$= a_0(1.02)^2(0.98)^2$
$= a_0(0.9996)^2$

$a_3 = a_0(1.02)(0.98)(1.02)(0.98)(1.02)(0.98)$
$= a_0(1.02)^3(0.98)^3$
$= a_0(0.9996)^3$

...

$a_n = a_0(0.9996)^n$

ii) $a_4 = a_0(0.9996)^4$
$= 50(0.9996)^4$
$= 49.92$

2\. a) $a_1 = 5$

$d = \frac{37}{7} - 5$
$= \frac{2}{7}$

$a_{n+1} = a_n + \frac{2}{7}$

$a_n = a_{n-1} + \frac{2}{7}$, $n \geq 1$

b)

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a(n) {
    if (n=1)
        return 5
    return a(n-1) + 2/7
}
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CHAP 3

3-1

1. 2 fair dice, 1 red, 1 blue

R \ B	1	2	3	4	5	6
1	(1,1)	(1,2)	(1,3)	(1,4)	(1,5)	(1,6)
2	(2,1)	(2,2)	(2,3)	(2,4)	(2,5)	(2,6)
3	(3,1)	(3,2)	(3,3)	(3,4)	(3,5)	(3,6)
4	(4,1)	(4,2)	(4,3)	(4,4)	(4,5)	(4,6)
5	(5,1)	(5,2)	(5,3)	(5,4)	(5,5)	(5,6)
6	(6,1)	(6,2)	(6,3)	(6,4)	(6,5)	(6,6)

i) sum of dice rolled is 6 = 5 ways
sum of dice rolled is 10 = 3 ways
number of ways = 5 + 3 = 8 ways

ii) at least one dice shows the number of 3
= 11 ways

iii) red dice which shows number 3 = 6 ways

2. i) pass through R1 to R3 via R2
R1 → R2 = 2 ways
R2 → R3 = 3 ways
number of ways to pass through R1 to R3 via R2 is 2 × 3 = 6 ways.

ii) 6 × 6 = 36 routines

3.

i) burger and side = 4 x 6 = 24 ways

burger and beverages = 4 x 5 = 20 ways

number of ways a meal-deal can be formed if Nina prefer a set that contain burger :

24 + 20 = 44 ways

ii) burger and side = 24 ways

burger and beverages with peach tea and lemon tea = 4 x 2 = 8 ways

number of ways a meal-deal can be formed if Nina does not like peach tea or lemon tea : 44 - 8 = 36 ways

iii) number of ways a meal-deal can be formed if Nina prefer main and side only = 4 x 6 = 24 ways.

4) 7 chocolate cakes

2 cheesecake

6 fruity cake

two layer cakes

∴ 7 + 2 + 6 + 1 = 16 options

3.2 and 3.3

1. i) permutations of 3 letters = 26^3 = 17576

permutations of 5 digits = 10^5 = 100 000

number of different subject codes = 17576 x 100 000 = 1757600000 ways

ii) $\underline{C}\ \underline{S}$ _ _ _ _ _ _ $\underline{3}$

$\underline{C}\ \underline{S}$ _ _ _ _ _ _ $\underline{2}$

$2(^{26}C_1 \times 10^4) = 2(260000)$

$= 520000$ ways

iii) permutations of all letters = $^{26}P_3$ = 15600

permutations of all digits = $^{10}P_5$ = 30240

number of ~~s~~ subject codes are possible in which all the letters and the digits are distinct = 15600 x 30240 = 471744000 ways

2. i) $C(10,3) = \dfrac{10!}{3!(10-3)!} = \dfrac{10!}{3!7!}$ = 120 ways

ii) $C(15,9) = \dfrac{15!}{9!(15-9)!} = \dfrac{15!}{9!6!}$ = 5005 ways

iii) $\dfrac{^8P_5}{2!} = \dfrac{8!}{2!(8-5)!}$ = 3360 strings

iv) $C(10,2) = \dfrac{10!}{2!8!}$ = 45 ways (to select 2 girls from 10 girls)

$C(7,2) = \dfrac{7!}{2!5!}$ = 21 ways (select 2 boys from 7 boys)

number of ways to select 2 girls and 2 boys

= 45 x 21 = 945 ways

3. $C(20,3) = \frac{20!}{3!(17!)} = 1140$ ways

$C(15,2) = \frac{15!}{2!(13!)} = 105$ ways

number of ways to set up the quiz $= 1140 \times 105 = 119700$ ways

3 - 4

1. pigeons - people $(n=40)$

pigeonholes - months $(m=12)$

$k = \lceil \frac{n}{m} \rceil = \lceil \frac{40}{12} \rceil = 4$

$\approx$ at least 4 people

2. pigeons - $n = 35$ students

pigeonholes - $m = 10$

$k = \lceil \frac{n}{m} \rceil = \lceil \frac{35}{10} \rceil = 4$ = at least 4 students

3. $X = \{1, 2, 3, 4, 5, 6, 7, 8, 9, 10\}$ Y = sum of 11

$Y = \{(10,1), (9,2), (8,3), (7,4), (6,5)\}$

Only 5 pairs of numbers that sum to 11.

By selecting 6th numbers, the Pigeonhole Principles show that at least one pairs will be choose. So the sum of 2 of them will be exactly 11.

4. pigeons : $n = 115$ different classes

. pigeonholes : $m = 53$ different time periods

$k = \lceil \frac{n}{m} \rceil = \lceil \frac{115}{53} \rceil = 3$

$\therefore$ at least 3 different room.

5. The number of connection of a computer have range 1-24.

If each computer must have connection, if require 25 connection, but only 24 connection available.

By Pigeonhole Principle, at least 2 computers must have the same number of direct connection.