SCHOOL OF COMPUTING

SEMESTER 1, 2020/2021

SECI1013-07 STRUKTUR DISKRIT

(DISCRETE STRUCTURE)

SECTION: 07

ASSIGNMENT 03

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Question 1

a)

i)

$A - B = \{1, \cancel{2}3, 4, 6, 7, 8\}$

ii) $A \cap B = \{2, 5\}$

$(A \cap B) \cup C = \{2, 5, a, b\}$

iii) $\cancel{A \cap}$ $A \cap B \cap C = \emptyset$

iv) $B \times C = \{(2, a), (2, b), (5, a), (5, b), (9, a), (9, b)\}$

v) $P(C) = 2^2$ $\{\{\}, \{a\}, \{b\}, \{a, b\}\}$
$= 4$

b) $(P \cap ((P' \cup Q)')) \cup (P \cap Q) = P$

$\cancel{((P')' \cap Q')}$

$(P \cap (P \cap Q')) \cup (P \cap Q)$

$\cancel{(P \cap (P \cap Q) \cup (P \cap Q)}$

$\cancel{P \cup (P \cap Q)}$

$\cancel{(P \cap (P \cap Q)}$

$\cancel{= P}$

$\cancel{(P \cap (P \cap Q')) \cup (P \cap Q)}$ $((P \cap P) \cap Q')$

$\cancel{(P \cap (Q - P)') \cup P \cap Q}$). $(P \cap Q') \cup (P \cap Q)$

$P \cap (Q' \cup Q)$

$P \cap U$

$= P$

c) $A = (\neg p \vee q) \leftrightarrow (q \rightarrow p)$

p	q	$\neg p$	$\neg p \vee q$	$q \rightarrow p$	$(\neg p \vee q) \leftrightarrow (q \rightarrow p)$
T	T	F	T	T	T
T	F	F	F	T	F
F	T	T	T	F	F
F	F	T	T	T	T

d) $(2n+1)^2$

$\cancel{(4n^2+4n+2)}$ $\quad 4n^2+4n+1$

$\cancel{2(2n^2+2n+1)}$ $\quad 2(2n^2+2n)+1$

$= 2m+1$

$\cancel{2(2n^2+2n)+1}$

$\cancel{2(2(n^2+n)+1)}$

e) i) $\exists x \exists y\, P(x,y)$

$x = 4 \quad y = 2$

. because exist one value of x and 1 value of y that make the the statement true

$4 \geq 2$ = True

statement is true

ii) $\forall x \forall y P(x,y)$

$x = 2 \quad y = 4$

, because not all value of x and value of y is true.

$2 \geq 4$ = False

statement is false

Question 2

a) domain = $\{1,2,3\}$

range = $\{1,2\}$

ii. The relation is not irreflexive because there still the relation of $\{1,1\}$ and $\{2,2\}$ and ~~not~~ antisymmetric because $\{1,2\} \in R$ but $\{2,1\} \notin R$

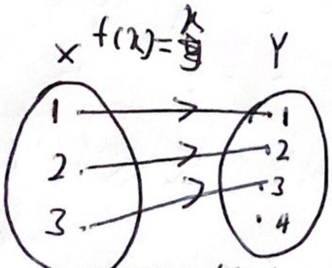
b) ~~i) $S = \{(2,2),(3,3),(4,4),(2,3),(3,2),(2,4),(4,2),(5,2),$~~

i) $S = \{(5,5),(4,5),(5,4)\}$

ii) S is not reflesive because only $(5,5) \in R$, not transitive becouse no $(x,y) \in R$ and $(y,z) \in R$ so $(x,z) \notin R$ and ~~it it~~ is symmetric because $(4,5) \in R$ and $(5,4) \in R$

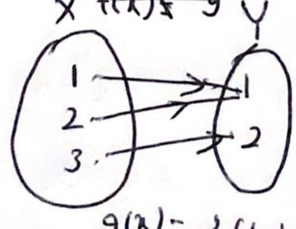
c)

i. $f(x) = \cancel{y}\ x$



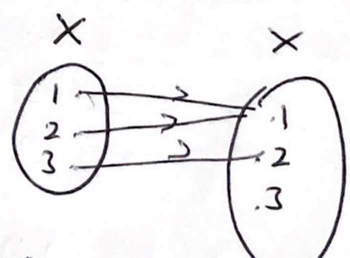
$f(x) = \{(1,1),(2,2),(3,3)\}$

ii.



$g(x) = \{(1,1),(2,\cancel{2}1),(3,2)\}$

iii.



$h(x) = \{(1,1),(2,2),(3,2\}$

d)

i) $m(x) = 4x + 3$

$y = 4x + 3$

$\frac{y-3}{4} = x$

$m^{-1}(x) = \frac{x-3}{4}$

ii) $nom(x) = \cancel{4}\ 2(4x+3) - 4$

$8x + 6 - 4$

$= 8x + 2$

$nom(x) = 2(4x+1)$

Answer to the question 3

ⓐ ① $a_1 = 1$

$a_2 = a(k-1) + 2k$

$\Rightarrow \cancel{2}\,(2-1) + 2 \cdot 2$

$\Rightarrow 5$

$a_3 = 5 + 2(3)$

$\Rightarrow 11$

② a(k)

```
a(k)
{
    if (k=1)
        return 1
    Return a(k-1) + 2k
}
```

b) $n_1 = 7$, $\therefore n_k = 2n_{k-1}$, $k \geq 2$

Recurrence relations

$n_2 = 2n_{2-1} = 2n_1 = 2 \times 7 = 14$

$n_3 = 2n_{3-1} = 2n_2 = 2 \times 14 = 28$

$n_4 = 2n_{4-1} = 2n_3 = 2 \times 28 = 56$

$n_k = 2n_k - 1$ [Final recurrence]

c)

Here, $S(1) = 5$

Trace $S(4)$,

$S(2) = 5 \times S(1)$

$= 5 \times 5 = 25$

$S(3) = 5 \times S(2)$

$= 5 \times 25$

$= 125$

$S(4) = 5 \times S(3)$

$= 5 \times 125$

$= 625$

Answer to the question no 5

(a)

Digit = 10.

letter = 6 .

∴ begain with 3 through B . contain 9.

end with 5 througs F contain 11

∴ $9 \times 16 \times 16 \times 11 = 25344$.

(b)

$\underbrace{A \ \_ \ \_ \ \_}_{\text{Letter}} \quad \underbrace{\_ \ \_ \ 0}_{\text{digit}}$

$1 \times 26 \times 26 \times 26 \times 10 \times 10 \times 1 = 1757600$

(c)

Computer = 8 letter.

Case 1: 1 letter = 8. = 8

Case 2: 2 letter = 8×7 = 56.

Case 3: 3 letter = $8 \times 7 \times 6$ = 336.

total = ~~8x~~ $8 + 56 + 336$

$\Rightarrow 400$

(d) man = 6. woman = 7.

$\therefore$ we can choose $= {}^{7}C_4 \times {}^{6}C_3$ ways.

$\Rightarrow$ 700 ways.

(e) In PROBABILITY has = 11 letter.

B = 2 I = 2.

$\therefore$ we can arrang in $= \dfrac{11!}{2! \times 2!} = 9979200$

(f) here, $n=6$ $r, 10$.

$\therefore C((6+10-1), 10) = C(15, 10)$.

$\Rightarrow \dfrac{15!}{10!\ 5!}$

$\Rightarrow 3003$

Answer to the question no 5

(a) The person first and last name are

$3 \times 2 = 6$ ⇒ ~~Pe~~ Pigeonholes ⇒ Probabilities of the name.

18 ⇒ Pegion ⇒ Person's

1	2	3	4	5	6.
7	8	9	10	11	12
13	14	15	16	17	18.

Here, by pigeonhole principle some of ~~peg~~ pigeon holes have alleast 3 pigeons.

(b) ~~He~~ Even number $= \{2, 4, 6, 8, 10, 12, 14, 16, 18, 20\}$.
⇒ 10 numbers

odd number $= \{1, 3, 5, 7, 9, 11, 13, 15, 17, 19\}$
⇒ 10 numbers

Here ; $10 + 1 = 11$

∴ Ansber ; 11 numbers

(c) 20 are divisionable by 5. ($~~n~~ = 20$).
80 are not divionable by 5. ~~no~~ ($k = 80$).

∴ Pick 81 Integers between 1 to 100.
in order to be sure of getting
one that divisionable by 5