SCHOOL OF COMPUTING

SEMESTER 1, 2020/2021

SECI1013-07 STRUKTUR DISKRIT

(DISCRETE STRUCTURE)

SECTION: 07

ASSIGNMENT 01

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Answer to the question no 1

Here,

$A = \{1,2\}$

$B = \{1,2,3\}$.

$C = \{3,4,5,6,7,8\}$.

$\therefore U = \{1,2,3,4,5,6,7,8\}$.

ⓐ $A \cup C$.

$\Rightarrow \{1,2\} \cup \{3,4,5,6,7,8\}$.

$\Rightarrow \{1,2,3,4,5,6,7,8\}$.

ⓑ $(A \cup B)'$.

$\Rightarrow (\{1,2\} \cup \{1,2,3\})'$

$\Rightarrow \{1,2,3\}'$.

$\Rightarrow \{4,5,6,7,8\}$.

ⓒ $A' \cup B'$.

$\Rightarrow \{1,2\}' \cup \{1,2,3\}'$

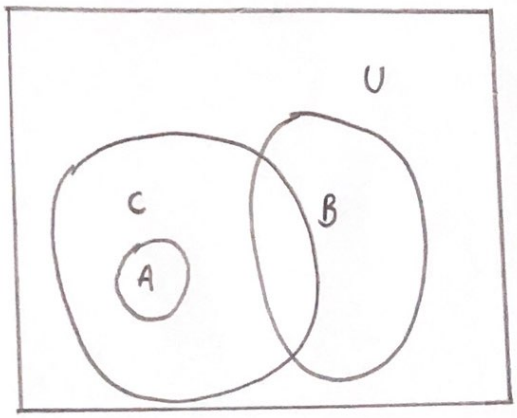
$\Rightarrow \{3,4,5,6,7,8\} \cup \{4,5,6,7,8\}$

~~$\Rightarrow \{3,4,5,6,7,8\}$~~

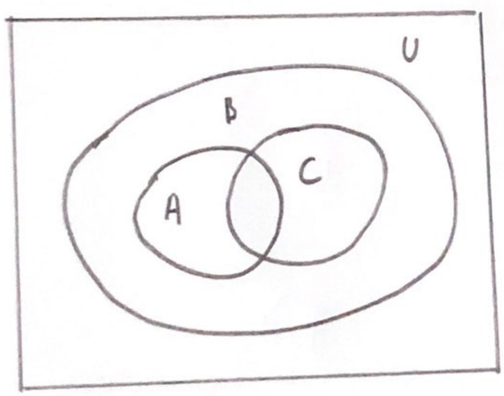
$\Rightarrow \{3,4,5,6,7,8\}$

2.

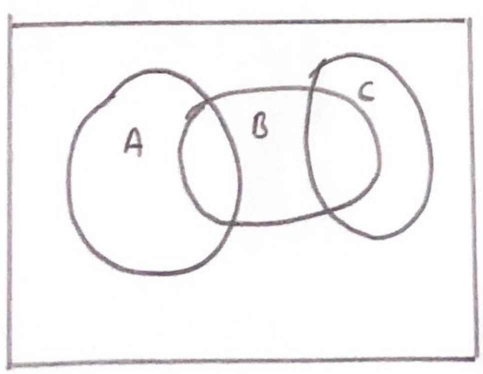
a) $A \cap B = \emptyset$, $A \subseteq C$, $C \cap B \neq \emptyset$



B) $A \subseteq B$, $C \subseteq B$, $A \cap C \neq \emptyset$



c) $A \cap B \neq \emptyset$, $B \cap C \neq \emptyset$, $A \cap C = \emptyset$, $A \not\subseteq B$, $C \not\subseteq B$



No.:

Answer 3:

$A = \{-1, 1, 2, 4\}$ $B = \{1, 2\}$

1. $A \times B$

$= \{(-1,1), (-1,2), (1,1)(1,2), (2,1), (2,2), (4,1), (4,2)\}$

2. $x S y \Rightarrow |x| = |y|$

$= \{(-1,1), (1,1), (2,2)\}$

3. $T \Rightarrow x - y$ is even

$= \{(-1,1), (1,1), (2,2), (4,2)\}$

4. $S \cap T$

$= \{(-1,1), (1,1), (2,2)\} \cap \{(-1,1), (1,1), (2,2)(4,2)\}$

$= \{(-1,1), (1,1), (2,2)\}$

5. $S \cup T$

$= \{(-1,1), (1,1), (2,2), (4,2)\}$

Answer to the question no 4

~~#~~ $\vdash$ P

$\neg((\neg p \wedge q) \vee (\neg p \wedge \neg q)) \vee (p \wedge q) \equiv p$

$\Rightarrow (\neg(\neg p \wedge q) \wedge \neg(\neg p \wedge \neg q)) \vee (p \wedge q) \equiv p$ [De, Morgan's law]

$\Rightarrow (\neg\neg p \vee \neg q) \wedge (\neg\neg p \vee \neg\neg q) \vee (p \wedge q) \equiv p$ [De, Morgan's l

$\Rightarrow (p \vee \neg q) \wedge (p \vee q) \vee (p \wedge q) \equiv p$ [double Negation law]

$\Rightarrow p \vee (\neg q \wedge q)\ (p \wedge q) \equiv p$ [distribution law]

$\Rightarrow (p \vee \phi) \vee (p \wedge q) \equiv p$ [complement law]

$\Rightarrow p \vee (p \wedge q) \equiv p$ [Identity law]

$\Rightarrow p \equiv p$ [Absorption law]

[showed]

5.

a)

$$A_1 = \begin{array}{c c} & \begin{array}{ccccc} 1 & 2 & 3 & 4 & 5 \end{array} \\ \begin{array}{c} 1 \\ 2 \\ 3 \\ 4 \\ 5 \end{array} & \begin{bmatrix} 1 & 1 & 1 & 1 & 1 \\ 1 & 1 & 1 & 1 & 0 \\ 1 & 1 & 1 & 0 & 0 \\ 1 & 1 & 0 & 0 & 0 \\ 1 & 0 & 0 & 0 & 0 \end{bmatrix} \end{array}$$

b)

$$A_2 \quad \begin{array}{c c} & \begin{array}{ccccc} 1 & 2 & 3 & 4 & 5 \end{array} \\ \begin{array}{c} 1 \\ 2 \\ 3 \\ 4 \\ 5 \end{array} & \begin{bmatrix} 0 & 0 & 0 & 0 & 0 \\ 1 & 0 & 0 & 0 & 0 \\ 1 & 1 & 0 & 0 & 0 \\ 1 & 1 & 1 & 0 & 0 \\ 1 & 1 & 1 & 1 & 1 \end{bmatrix} \end{array}$$

c) R_1 is not a reflesive relation

$$A_1^T = \begin{array}{c c} & \begin{array}{ccccc} 1 & 2 & 3 & 4 & 5 \end{array} \\ \begin{array}{c} 1 \\ 2 \\ 3 \\ 4 \\ 5 \end{array} & \begin{bmatrix} 1 & 1 & 1 & 1 & 1 \\ 1 & 1 & 1 & 1 & 0 \\ 1 & 1 & 1 & 0 & 0 \\ 1 & 1 & 0 & 0 & 0 \\ 1 & 0 & 0 & 0 & 0 \end{bmatrix} \end{array}$$

$A_1 = A_1^T$

R_1 is symmetric relation

$(1,1)$ and $(1,2) \in R_1$

$(1,1)$ and $(1,3) \in R_1$

$(1,1)$ and $(1,4) \in R_1$

$(1,1)$ and $(1,5) \in R_1$

$(2,1)$ and $(1,1) \in R_1$

$(2,1)$, $(1,2)$ and $(2,2) \in R_1$

$(2,1)$ $(1,3)$ and $(2,3) \in R_1$

$(2,1)$, $(1,4)$ and $(2,4) \in R_1$

$(2,1)$ and $(1,5) \in$ to R_1 but $(2,5) \notin R_1$

R_1 is not transitive relation.

R_1 only symmetric relation so it is not equivalence relation d)

A_2, we can see that all element in main diagonal are not 1, R_2 is not reflexive relation

$(2,1) \in R_2$ but $(1,2) \notin R_2$
$(3,1) \in R_2$ but $(1,3) \notin R_2$
$(3,2) \in R_2$ but $(2,3) \notin R_2$
$(4,1) \in R_2$ but $(1,4) \notin R_2$
$(4,2) \in R_2$ but $(2,4) \notin R_2$
$(4,3) \in R_2$ but $(3,4) \notin R_2$
$(5,1)$ $\overset{\in}{\cancel{\notin}}$ R_2 but $(1,5) \notin R_2$
$(5,2) \in R_2$ but $(2,5) \notin R_2$
$(5,3) \in R_2$ but $(3,5) \notin R_2$
$(5,4) \in R_2$ but $(4,5) \notin R_2$

R_2 is antisymmetric

R_2 is also transitive relation

R_2 is antisymmetric and transitive but not reflexive so it is not partial order relation.

No.:

Answer 6:

ⓐ $R_1 = \{(1,1),(2,2),(3,3),(2,3),(3,1)\}$

$R_2 = \{(1,2),(2,2),(3,1),(3,3)\}$

a) $R_1 \cup R_2 = \{(1,1),(1,2),(2,2),(2,3),(3,1),(3,3)\}$

The matrix of relation $R_1 \cup R_2$

$$\Rightarrow R_A^T = \begin{array}{c|ccc} & 1 & 2 & 3 \\ \hline 1 & 1 & 1 & 0 \\ 2 & 0 & 1 & 1 \\ 3 & 1 & 0 & 1 \end{array}$$

ⓑ $R_1 \cap R_2 = \{(2,2),(3,1),(3,3)\}$

The matrix of relation $R_1 \cap R_2$

$$\Rightarrow R_B^T = \begin{array}{c|ccc} & 1 & 2 & 3 \\ \hline 1 & 0 & 0 & 0 \\ 2 & 0 & 1 & 0 \\ 3 & 1 & 0 & 1 \end{array}$$

~~A3~~

Answer to the question no 7

$f: \mathbb{R} \to \mathbb{R}$, $g: \mathbb{R} \to \mathbb{R}$ are both one- one function

$f+g$ may not be one - one function.

Ex-

$f: \mathbb{R} \to \mathbb{R}$ as $f(x) = x$.

$g: \mathbb{R} \to \mathbb{R}$ as $g(x) = -x$.

$(f+g)(x) = x + (-x) = 0 \quad \forall x \in \mathbb{R}$.

so $f(x)$ and $g(x)$ are one - one function.

but $f+g$ is not.

8.

$C_1 = 1$

$C_2 = 2$

$C_n = C_{n-1} + C_{n-2}$ when $n \geqslant 3$

No.:

Answer 9:

$t_1 = t_2 = 1$

$t_n = (t_{n-1}) + (t_{n-2}) + (t_{n-3})$; $n \geq 3$

(a) Find. t_7

$t_4 = t_3 + t_2 + t_1 = 2 + 1 + 1 = 4$

$t_5 = t_4 + t_3 + t_2 = 4 + 2 + 1 = 7$

$t_6 = t_5 + t_4 + t_3 = 7 + 4 + 2 = 13$

$t_7 = t_6 + t_5 + t_4 = 13 + 7 + 4 = 24$

(b) Recursive algorithm to compute t_n; $n \geq 0$

```
input = t

Output = f(t)

f(t)
{   if (1 ≤ n ≤ 3)
        return 1;
    else
        return f(t-1) + f(t-2) + f(t-3);
}
```