

Mock Test for ICT 1

(1) What set builder notation below defines the interval $(2, 9)$

$$\{x : 2 < x < 9\}$$

$$\{x : 2 < x \text{ and } x < 9\}$$

(2) Given two sets $A = [20, 30]$ and $B = \{30, 31\}$ what is the result of the following operation $A \setminus B$

$$A \setminus B = A \cap B' \quad B' = [20, 30)$$

$$A \setminus B = [20, 30)$$

(3) Which of the following is true

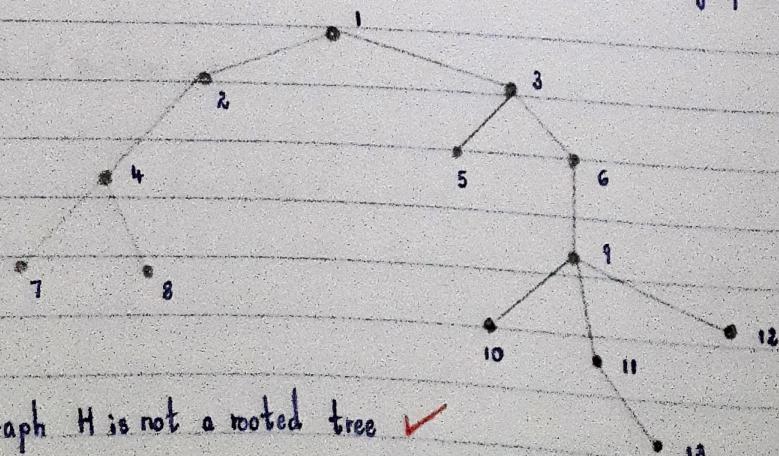
$$[1, 4] \subseteq [0, 4) \quad 1, 2, 3, 4$$

$$[1, 4] \subseteq \{0, 1, 2, 3, 4\} \quad (1, 5, 2, 5) \quad 0, 1, 2, 3$$

$$\{1, 4\} \subseteq [1, 4] \quad 1, 2, 3, 4$$

$$[1, 4] \subseteq (2, 4) \quad 3, 4$$

(4) Which statement below is not true in relation to this graph H



Graph H is not a rooted tree ✓

(3) Which set below is defined by the following notation, where z is a set of integers $\{x \in \mathbb{Z} : x^2 = 64\}$

$$\{ -8, 8 \}$$

(4) How many times in the final column of the truth table of the formula $p \rightarrow (q \vee \neg q)$ the value false would occur.

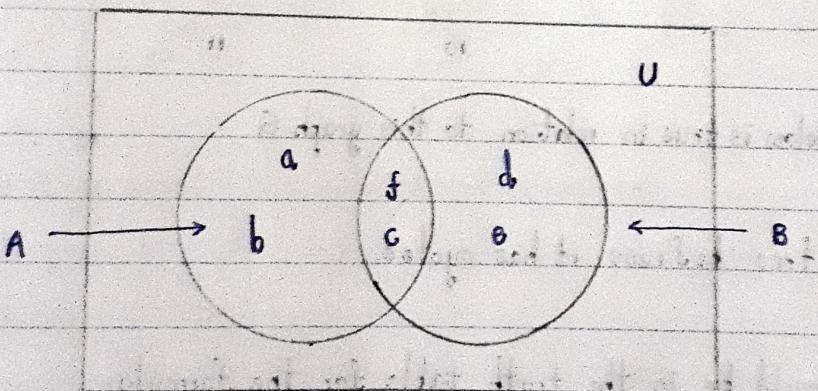
P	q	$\neg q$	$q \vee \neg q$	$p \rightarrow (q \vee \neg q)$
T	T	F	T	T
T	F	T	T	T
F	T	F	T	T
F	F	T	T	T

$\neg q$	$q \vee \neg q$
T	T
F	T
T	T

P	$(q \vee \neg q)$	C
T	T	T
F	T	T
T	T	T

O ✓

(5) Which operation is not represented by the following Venn diagram.



$$B \setminus A = \{c, f\} \quad \checkmark$$

$$A = \{a, b, c, f\}$$

$$B = \{c, d, e, f\}$$

$$B' = \{a, b\}$$

$$A \setminus B = A \cap B' = \{a, b\} \quad A' = \{d, e\}$$

$$A \cup B = \{a, b, c, d, e, f\}$$

$$B \setminus A = B \cap A' = \{d, e\}$$

$$A \cap B = \{c, f\}$$

- (8) Let A be the interval $(4, 25)$. Which of the following defines the set, satisfying the condition $\{x \in A : 5x \in A\}$

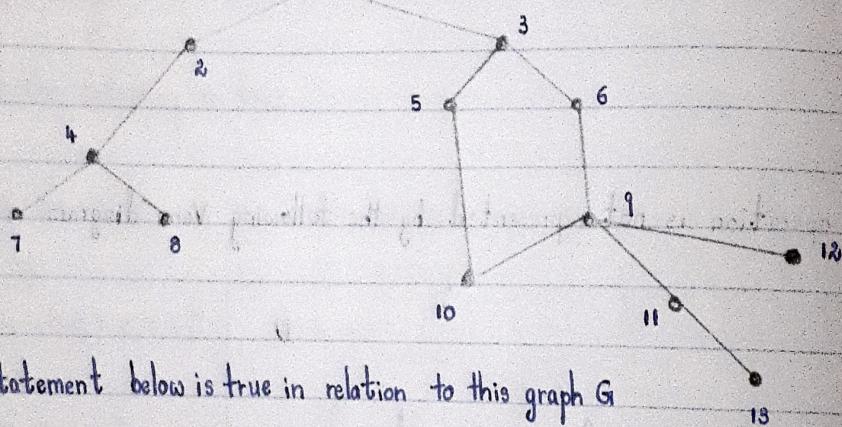
$$A = \{4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22, 23, 24, 25\}$$

$(16, 25)$ ✓

- (9) What is the result of the following operation.
 $(40, 70) \cap [40, 70]$

83 ✓

(10)



Which statement below is true in relation to this graph G ?

Graph G is not a tree because it has cycles. ✓

- (11) How many rows would be in the truth table for the formulae
 $\neg(p \rightarrow (q \vee \neg q)) \vee (\neg p \rightarrow (q \vee \neg q))$

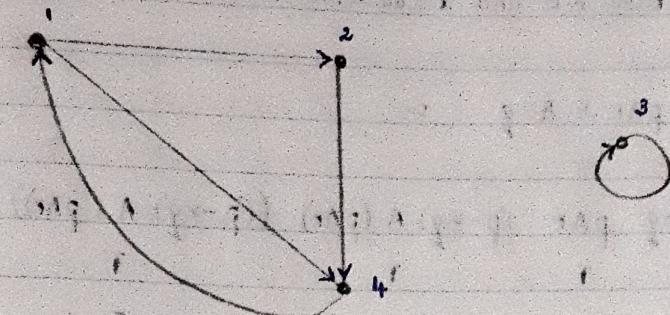
$$3^n = 2^3 = 8$$

- (12) Graph L is defined as follows $V = \{a, b, c, d\}$ and $E = \{\{a, b\}, \{b, c\}, \{c, d\}\}$
 Which statement below is not true in relation to this graph L .



Graph L is disconnected.

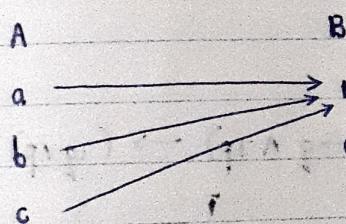
Which sets V and E describes the following graph k



$$V = \{1, 2, 3, 4\}$$

$$E = \{(1, 2), (2, 4), (1, 4), (4, 1), (3, 3)\}$$

You are given the following mapping rule $R = \{(a, 1), (b, 1), (c, 1)\}$. Which situation defines a function which applies this rule to map objects from the domain A to objects of the co-domain B .



$$A = \{a, b, c\} \quad B = \{1, 0\}$$

We know A is a set. Calculate $|A \times A| - (|A| \times |A|)$

$$A = \{a, b, c\}$$

$$|A \times A| = 3 \times 3$$

$$|A| \times |A| = |A|^2$$

$$= 9$$

$$|A \times A| - (|A| \times |A|) = 9 - 9$$

$$= 0$$

(16) Which one of the following cases represent logical consequence between the knowledge base KB and a statement A

(1) $KB = \{ p \rightarrow q, p \wedge r \}, A = q$ ✓

P	q	r	$p \rightarrow q$	$p \wedge r$	$(p \rightarrow q) \wedge (p \wedge r)$	$((p \rightarrow q) \wedge (p \wedge r)) \rightarrow q$
T	T	T	T	T	T	T
T	T	F	T	F	F	T
T	F	T	F	F	F	T
T	F	F	F	F	F	T
F	T	T	T	T	T	T
F	T	F	T	F	F	T
F	F	T	T	F	F	T
F	F	F	T	F	F	T

(2) $KB = \{ p \rightarrow q, \neg p \}, A = \neg q \vee p$

P	q	$\neg p$	$p \rightarrow q$	$(p \rightarrow q) \wedge \neg p$	$\neg q$	$(\neg q \vee p)$	$(p \rightarrow q) \wedge \neg p \rightarrow (\neg q \vee p)$
T	T	F	T	F	F	T	T
T	F	F	F	F	T	T	T
F	T	T	T	T	F	F	F
F	F	T	T	T	T	T	T

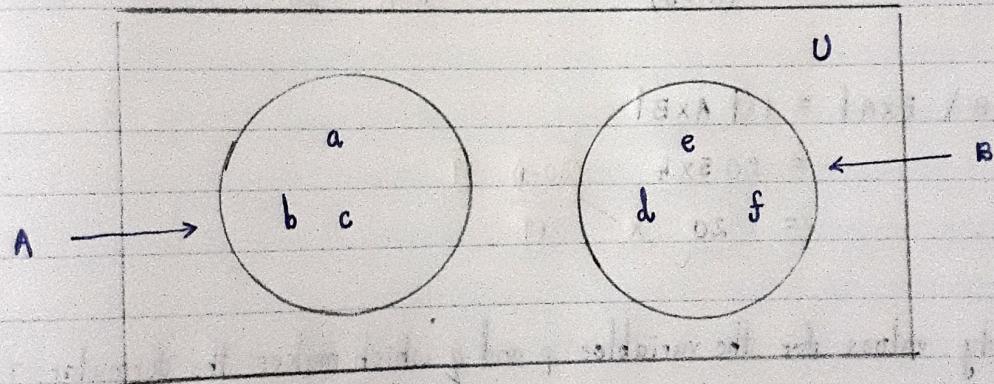
(3) $KB = \{ p \rightarrow \neg q, q \}, A = p \wedge q$

P	q	$\neg q$	$p \rightarrow \neg q$	$p \rightarrow \neg q \wedge q$	$p \wedge q$	$(p \rightarrow \neg q \wedge q) \rightarrow p \wedge q$
T	T	F	F	F	T	T
T	F	T	T	F	F	T
F	T	F	T	T	F	T
F	F	T	T	F	F	T

$$KB = \{ p \vee q, r \wedge \neg p \}, A = \neg q$$

P	q	r	$p \vee q$	$\neg p$	$r \wedge \neg p$	$(p \vee q) \wedge (r \wedge \neg p)$	$\neg q$	$(p \vee q) \wedge (\neg r \wedge \neg p)$	$\rightarrow \neg q$
T	T	T	T	F	F	F	F	T	
T	T	F	T	F	F	F	F	T	
T	F	T	T	F	F	F	T	T	
T	F	F	T	F	F	F	T	T	
F	T	T	T	T	T	T	F	F	
F	T	F	T	T	F	F	F	T	
F	F	T	F	T	T	F	T	T	
F	F	F	F	T	F	F	T	T	

In the following Venn diagram the universal set U has only those elements that belongs to $A \cap B$. Which operation below corresponds to the Venn diagram?



$$\begin{aligned} A \setminus B &= A \cap B' \\ &= \{a, b, c\} \end{aligned}$$

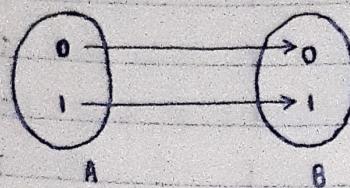
$$A \cup B = \{a, b, c, d, e, f\}$$

$$\begin{aligned} A \cap B &\subseteq A \setminus B \\ \{\} &\subseteq \{a, b, c\} \end{aligned}$$

$$A \cap B = \{\}$$

(18) Let $A = B = \{0, 1\}$

Which of the following relation is a function with domain A and co-domain B?



$$\{(1,1), (0,0)\}$$

(19) Let $A = \{a, b, c, d, e\}$ $B = \{e, f, g, h\}$

The cardinality of the set $|A \times B \setminus B \times A|$ is

$$(e, e)$$

$$A \times B \setminus B \times A = (A \times B) \cap (B \times A)^c$$

$$= (A \times B) \quad B \times A = 20$$

$$|A \times B \setminus B \times A| = |A \times B|$$

$$= 20$$

$$= 19$$

(20)

The only values for the variables p and q which makes the formula $\neg(\neg p \vee q)$ true are

P	q	$\neg p$	$\neg p \vee q$	$\neg(\neg p \vee q)$
T	T	F	T	F
T	F	F	F	T
F	T	T	T	F
F	F	T	T	F

True False
 $\neg(\neg p \vee q)$ $\neg p \vee q$
 F F

p - True

q - False