

Bangladesh University of Business
And Technology

Program BSc in CSE

Semester : Second semester

Course Code : CSE 103

Course Title : Discrete Mathematics

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Intake : 37

Am to the Q no: 1 (b)
Given statement,

- I go to the beach whenever it is a sunny
summer day q

$$-(p \rightarrow q)$$

Converse: $(q \rightarrow p)$

- It is a sunny summer day whenever I
go to the beach.

Inverse: $(\neg p \rightarrow \neg q)$

- I do not go to the beach whenever it is not
a sunny summer day

Contrapositive: $(\neg q \rightarrow \neg p)$

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→ It is not a sunny summer day
whenever I do not go to the beach

I go to the beach whenever it

is sunny

(P → Q) -

(Q → P) : converse

It is a sunny summer day whenever I go to the beach

(P → Q) : converse

I go to the beach whenever it is sunny

(ii) Answer the Q no 1 (a)

_____ 0 _____

Solution

(a) $P \rightarrow Q$

(b) $\neg Q \leftrightarrow \neg R$

(c) $Q \rightarrow \neg R$

(d) $P \vee Q \vee R$

(a) Am to the Q no 2 (b)

Given, $P(x) = x$ has visited North Dakota
 x is a student in your school

Solution:

Express each of these quantifications
in English sentence

a) $\exists x P(x) \rightarrow$ There exists a student
in your school who has visited North
Dakota,

b) $\forall x P(x) \rightarrow$ All students in your
school have visited North Dakota.

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c) $\exists x P(x) \rightarrow$ there exists a student
in your school who
visited North Dakota

d) $\forall x \neg P(x) \rightarrow$ All student in your
school have not visited North Dakota.
 $\neg \exists x P(x) \equiv \forall x \neg P(x)$

Am to the Q no 3 (b)

~~Am to the Q no 3 (b)~~

First replace the letters in the message with numbers the products

3 14 13 14 19 15 0 18 18 0 22 0 24

Now replace each of numbers p by $f(p) = (p+3) \mod 26$

$$f(p) = (p+3) \mod 26$$

6 17 16 17 22 18 3 21 21 3 25 3 1
~~0 25 0 1~~

Translating this back to letters produces

The encrypted message "GR Q R W S D R

~~A 2 A B~~ D Z D B

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Ans to the Q no: 2(a)

Solution:

Let $P =$ "bluma works hard"

$Q =$ "she is a good girl"

$R =$ "she will get the job"

Step

1. P

2. $P \rightarrow Q$

3. Q

4. $Q \rightarrow R$

5. $\neg R$

Reason

Hypothesis

Hypothesis

modus ponens (1,2)

Hypothesis

modus ponens (3,4)

The conclusion is $\neg R$: "she will not

Get job"

Ans

Ans to the Q no : 3 (a)

a) One-to-one ~~because~~ because no outputs repeat,

definition why: A function is injective

(one-to-one). if for arbitrary $x, y \in A$ with $x \neq y$ then $f(x) \neq f(y)$

Result: Yes

b) Not one-to-one because repeats twice.

definition why: A function is not

injective (not one-to-one): if particular

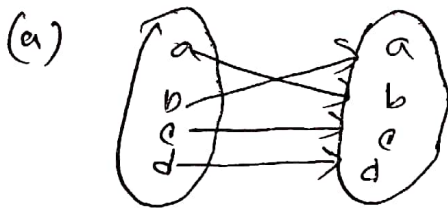
Elements $x, y \in A$ such that $x \neq y$ and $f(x) = f(y)$

result: No

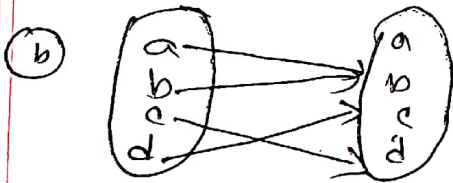
c) not one-to-one because d repeat twice

definition why: This basically means different input cannot have the same output,

result: No



Explain: one-to-one because no outputs repeat



Explain: not one-to-one because b repeat two times,



Explain: not one-to-one because d repeat two times,