

COPYRIGHT ©2020 BY SHANAZ WAHID  
MATH 1152 ASSIGNMENT 1 SOLUTIONS

**NUMBER 1**

[i] We can re-write the proposition as the following :

$$a : \sim p \implies q$$

$$b : \sim r \implies \sim q$$

$$c : \sim r$$

**METHOD 1:**

We need all of the three premises to all have truth value **T** in the first case. Thus ,  $\sim r$  is true when  $r$  is false.

In the second premise , since  $\sim r$  is true this means that  $\sim q$  is true , since we need  $\sim r \implies \sim q$  to be true. This  $q$  is false.

Also , the statement  $p$  is taken as false since  $q$  is false.

p	q	r	$p \longrightarrow q$	$\sim r \longrightarrow \sim q$	$\sim r$	Premises	$\sim p$
F	F	F	T	T	T	T	T

Hence from the shortened truth table seen above , the conclusion is valid and logically consistent with the premises.

**METHOD 2 :** We can set up the entire truth table and test ,  $a \wedge b \wedge c \longrightarrow d$

p	q	r	$p \implies q$	$\sim r \implies \sim q$	$\sim r$	$\sim q$	$a \wedge b \wedge c$	$\sim p$	$a \wedge b \wedge c \implies d$
T	T	T	T	T	F	F	F	F	T
T	T	F	T	F	T	F	F	F	T
T	F	T	F	T	F	T	F	F	T
T	F	F	F	T	T	T	F	F	T
F	T	T	T	T	F	F	F	T	T
F	T	F	T	F	T	F	F	T	T
F	F	T	T	T	F	T	F	T	T
F	F	F	T	T	T	T	T	T	T

Since  $a \wedge b \wedge c \longrightarrow d$  is a tautology , the conclusion is logically consistent with the propositions.

**NUMBER [2]**

$p$  : Tom reads the paper

$q$  : Tom watches TV

$r$  : Tom jogs daily

(a)  $p \wedge q$  [3 marks]

(b)  $p \vee r$  [3 marks]

(c)  $p \implies \sim q$  [3 marks]

(d)  $p \iff r$  [3 marks]

(e)  $\sim (r \implies p)$  [3 marks]

(f)  $(q \vee r) \wedge \sim (q \wedge r)$  [3 marks]

**NUMBER [3]**

(i) Whenever Tom reads the papers and watches TV , he jogs daily. [4 marks]

(ii) It is not the case that Tom reads the papers if and only if he watches TV. [4 marks]

(iii) If Tom neither reads the papers nor watches TV then he jogs daily. [4 marks]

(iv) If Tom doesn't read the papers or he doesn't watch TV then he jogs daily. [4 marks]

- (v) If Tom reads the papers then either he watches TV or jogs daily. [4 marks]
- (vi) It is not the case that if Tom reads the papers , he would watch TV when he has jogged. [4 marks]
- (vii) Tom reads the papers , watches TV and doesn't jog daily. [4 marks]
- (viii) Each day once Tom reads the papers , he decides to watch TV which means that it is time to jog. [4 marks]

**NUMBER [4]**

- (a) I am not thirsty. [3 marks]
- (b) I am right and you are right. ( Both of us are right ) [3 marks]
- (c) There is a fire engine which is not real. [3 marks]
- (d) All triangles are not equilateral. [3 marks]
- (e) Somebody knows me. [3 marks]
- (f) All elephants are real. [3 marks]

**NUMBER [5]**

Let  $a$  ,  $b$  ,  $c$  , be propositions . We construct the following truth table:

$a$	$b$	$c$	$a \wedge c$	$(a \wedge b) \rightarrow c$	$b \implies c$	$a \rightarrow (b \rightarrow c)$
T	T	T	T	T	T	T
T	T	F	T	F	F	F
T	F	T	F	T	T	T
T	F	F	F	T	T	T
F	T	T	F	T	T	T
F	T	F	F	T	F	T
F	F	T	F	T	T	T
F	F	F	F	T	T	T
1	2	3	4	5	6	7

Using columns five (5) and seven (7) , the statements are equivalent.

$$\text{ie. } (a \wedge b) \rightarrow c \equiv a \rightarrow (b \rightarrow c)$$

[14 marks]

<sup>1</sup>The materials provided by the instructor in this course are for the use of the students enrolled in the course. Copyrighted course materials may not be further disseminated.

Materials are presented in an educational context for personal use and study and should not be shared, distributed, or sold in print—or digitally—outside the course without permission. As a student your ability to post or link to copyrighted material is also governed by University of the West Indies St. Augustine , Trinidad , W.I. law. The law allows for students to post or link to copyrighted materials within the course environment when the materials are pertinent to course work. Instructors—or other staff of the institution—reserve the right to delete or disable your post or link if in their judgment it would involve violation of copyright law.  
Edited and compiled by Saleem Kamaludin.