
 KEMENTERIAAN PENDIDIKAN MALAYSIA		 POLITEKNIK MALAYSIA		COURSE CODE/ COURSE NAME		DBM2033 DISCRETE MATHEMATICS	
				COURSEWORK ASSESSMENT		TUTORIAL 1	
		JABATAN MATEMATIK, SAINS DAN KOMPUTER		SESSION		DECEMBER 2018	
				DURATION	60 MINS	CLO1	
NAME			CLO2			20 MARKS	
REGISTRATION NO.			CLO3				
PROGRAMME/ SECTION				TOTAL MARKS		20 MARKS	

### Instructions

- Answer ALL questions. Write your answers in the spaces provided.
- Show your working to get marks. You may use a non-programmable scientific calculator.

### Question 1

CLO2, C3

[4 marks]

- (a) Construct a truth table for the following statement.

$$[p \wedge (q \vee \sim r)] \rightarrow (\sim p \wedge q)$$

CLO2, C2

[2 marks]

- (b) Identify any tautology.

### Question 2

CLO2, C2

[4 marks]

Given the following statements:

P: Sarah is a student in polytechnic.

Q: CC is the best institution in Malaysia.

- (a) Express each of the following compound statements in symbolic form.

- (i) Sarah is not a student at polytechnic but CC is the best institution in Malaysia.  $\sim P \wedge Q$
- (ii) Sarah is a student at polytechnic or CC is not the best institution in Malaysia.  $P \vee \sim Q$

- (b) Suppose that the statement P is true and Q is false. Determine its truth value for (i) and (ii).

$$(i) F \wedge F = F$$

$$(ii) T \vee T = T$$

### Question 3

CLO2, C2

[4 marks]

Let  $A = \{1, 2, 3, \dots, 5\}$ . Determine the truth value of each of the following statements.

- (a)  $(\exists x \in A) (x + 3 = 10)$  **F**
- (b)  $(\forall x \in A) (x + 3 < 10)$  **T**
- (c)  $(\exists x \in A) (x + 3 < 5)$  **T**
- (d)  $(\forall x \in A) (x + 3 \leq 7)$  **F**



#### Question 4

CLO2, C3

[6 marks]

Write the arguments in symbolic form. Then establish the validity of the arguments.

It is not sunny this afternoon and it is colder than yesterday.

We will go swimming only if it is sunny.

If we do not go swimming, we will play basketball.

If we play basketball, we will go home early.

Using the rules of inferences, can you conclude "We go home early".

Step 1: Use the variables to represent the statements (P, Q, R, S and T).

Step 2: Write the valid argument with the premises and conclusion.

Premises: ...

Conclusion:

Step 3: Using the rules of inferences, can you conclude "We go home early".

P: It is sunny this afternoon.

Q: It is colder than yesterday.

R: We will go swimming.

S: We will play basketball

T: We will go home early.

$\neg P \wedge Q$

$R \rightarrow P$

$\neg R \rightarrow S$

$S \rightarrow T$

T ————— conclusion.

Step		
1	$\neg P \wedge Q$	Premise
2	$\neg P$	Simplification using (1)
3	$R \rightarrow P$	Premise
4	$\neg R$	Modus Tollens using (2) and (3)
5	$\neg R \rightarrow S$	Premise
6	S	Modus ponens using (4) and (5)
7	$S \rightarrow T$	Premise
8	T	Modus ponens using (6) and (7)