

DISCRETE MATHEMATICS (DBM2033)

Session December 2017

SELF-EXERCISE 2

Instructions

- Answer ALL questions. Write your answers in the spaces provided.
 - Show your working. You may use a non-programmable scientific calculator.
1. Given p , q and r are the propositions:
 p : Amy will study mathematics.
 q : Amy will go to the beach.
 r : Amy is in a good mood.
State each of the following propositions using the symbols and logical connectives.
(a) Amy will not go to the beach and she will study mathematics.
(b) If Amy does not study the mathematics then Amy is not in a good mood.
 2. Construct the truth table for $[\sim p \wedge (p \vee q)] \rightarrow q$ and then determine whether it is a tautology.
 3. Determine whether $\sim p \leftrightarrow q$ and $\sim q \leftrightarrow p$ are logically equivalent or not. Justify your answer.
 4. Calculate the bitwise **OR** and bitwise **AND** for the following pairs of bit strings:
00 1111 0001, 10 0100 1000
 5. Solve $(0\ 1010 \vee 1\ 1011) \oplus 0\ 1000$.
 6. Illustrate a digital circuit that produces the output $[(\sim p \vee \sim r) \wedge \sim q] \vee [\sim p \wedge (q \vee r)]$ when given input bits p , q and r .