School of Electrical Engineering & Computing
University of Newcastle
COMP1010 –Computing Fundamentals

Workshop Week 12

Compound Statements

1. Define the following mathematical symbols

   a) ~

   b) $\wedge$

   c) $\vee$

2. Taking into account the rule of "order of operations". What is another way we can re-write the statement below to make the order more clear

   ~p $\wedge$ q

3. Write the following statements in symbolic form using the symbols ~, $\vee$, and $\wedge$ and the indicated letters to represent component statements.

   a) Juan is a math major but not a computer science major. (m = "Juan is a math major," c = "Juan is a computer science major")

   b) Either this polynomial has degree 2 or it has degree 3 but not both. (n = "This polynomial has degree 2," k = "This polynomial has degree 3")

   c) Let h = "John is healthy," w = "John is wealthy," and s = "John is wise."

      i. John is not wealthy but he is healthy and wise.

      ii. John is neither healthy, wealthy, nor wise.

      iii. John is wealthy, but he is not both healthy and wise.

Truth Tables and Equivalences

4. The following table is a truth table for the statement ~p

p	$\sim p$
T	F
F	T

Provide truth tables for the following statements

a) p∧q

b) p∨q

c) ~(p ∧ q)

d) ~(p∧q) ∨(p∨q)

5. The first statement in DeMorgan's law states the following:

"The negation of an *and* statement is logically equivalent to the *or* statement in which each component is negated"

Put together a truth table to prove this is true.

Conditional Statements

The notation $p \rightarrow q$ indicates that → is a connective, just like $\wedge$ or $\vee$, that can be used to join statements to create new statements. It essentially means "if p then q"

The truth table for $p \rightarrow q$ is as follows

p	q	$p \rightarrow q$
T	T	T
T	F	F
F	T	T
F	F	T

6. Use truth tables to verify the following logical equivalence. Include a few words of explanation with your answers

$\sim(p \rightarrow q) \equiv p \wedge \sim q$