Dawson College: Principles of Mathematics and Logic: 360-124-DW-S01: Winter 2013

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Quiz: Tautologies, Contradictions and Contingent Statements

No books, calculators, notes or cell phones are allowed. You must show all your work, the correct answer is worth 1 mark the remain marks are given for the work. If you need more space for your answer use the back of the page.

Question 1. *(6 marks)* WITHOUT USING A TRUTH TABLE: Show that the following statement is contingent.

$(\neg A \vee B) \rightarrow \neg(A \wedge B)$

Lets find a valuation that makes the statement true
and " " " " " " false

If $(\neg A \vee B)$ is false then the statement is true. For it to be false, both disjuncts need to be false. In order for $\neg A$ to be false, A needs to be true and we let B be false.

If $(\neg A \vee B)$ is true and $\neg(A \wedge B)$ is false then the statement false. For $\neg(A \wedge B)$ to be false $A \wedge B$ need to be true, so A and B need to be true. It follows that if A and B are true $(\neg A \vee B)$ is true since $\neg T \vee T = F \vee T = T$.