THOMPSON RIVERS UNIVERSITY

COMP 3710 - 3
Applied Artificial Intelligence (3,1,0)
Fall 2017

Seminar/Lab 5.

Propositional logic, and genetic algorithm for TSP

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1. (2 marks) Which of the followings are correct? You need to prove or disprove using truth tables.
   a. $(A \wedge B) \rightarrow C \equiv (A \rightarrow C) \vee (B \rightarrow C)$
   b. $(C \vee (\sim A \wedge \sim B)) \equiv ((A \rightarrow C) \wedge (B \rightarrow C))$

a.

$(A \wedge B) \rightarrow C \equiv (A \rightarrow C) \vee (B \rightarrow C)$ (Correct)

A	B	C	$A \wedge B$	$(A \wedge B) \rightarrow C$
T	T	T	T	T
T	T	F	T	F
T	F	T	F	T
T	F	F	F	T
F	T	T	F	T
F	T	F	F	T
F	F	T	F	T
F	F	F	F	T

A	B	C	$(A \rightarrow C)$	$(B \rightarrow C)$	$(A \rightarrow C) \vee (B \rightarrow C)$
T	T	T	T	T	T
T	T	F	F	F	F
T	F	T	T	T	T
T	F	F	F	T	T
F	T	T	T	T	T
F	T	F	T	F	T
F	F	T	T	T	T
F	F	F	T	T	T

b.

$(C \vee (\sim A \wedge \sim B)) \equiv ((A \rightarrow C) \wedge (B \rightarrow C))$ (Correct)

A	B	C	~A	~B	$\sim A \wedge \sim B$	$(C \vee (\sim A \wedge \sim B))$
T	T	T	F	F	F	T
T	T	F	F	F	F	F
T	F	T	F	T	F	T
T	F	F	F	T	F	F
F	T	T	T	F	F	T
F	T	F	T	F	F	F
F	F	T	T	T	T	T
F	F	F	T	T	T	T

A	B	C	$A \rightarrow C$	$B \rightarrow C$	$((A \rightarrow C) \wedge (B \rightarrow C))$
T	T	T	T	T	T
T	T	F	F	F	F
T	F	T	T	T	T
T	F	F	F	F	F
F	T	T	T	T	T
F	T	F	T	F	F
F	F	T	T	T	T
F	F	F	T	T	T

2. (2 marks) Simplify the followings as much as possible.

   c. $\sim(\sim A \wedge B) \wedge (A \vee B)$

   d. $\sim((\sim A \wedge B) \vee (\sim A \wedge \sim B))$

t: tautology c:contradiction

c.

$\sim(\sim A \wedge B) \wedge (A \vee B) = (A \vee \sim B) \wedge (A \vee B) = A \vee (\sim B \wedge B) = A \vee c = A$

d.

$\sim((\sim A \wedge B) \vee (\sim A \wedge \sim B)) = \sim(\sim A \wedge (B \vee \sim B)) = \sim (\sim A \wedge t) = A \vee c = A$