

COMP 681 Formal Methods Spring 2008 Quiz 1—Solutions

1. Encode the following into the language of propositional logic. Define the prime propositions that you use.

Smith plays center unless State plays Jones at center or Wells at forward; in the former case, Wilson and Smith are at center and forward, respectively, and, in the latter case, Williams is at center (as long as he's healthy) and Smith is out of the lineup.

Answer

Let

p = Smith plays center.

q = State plays Jones at center.

r = State plays Wells at forward.

s = Wilson plays center.

t = Smith plays forward.

u = Williams plays center.

v = Williams is healthy.

w = Smith is out of the lineup.

Then

$$(\neg(q \vee r) \Rightarrow p) \wedge (q \Rightarrow s \wedge t) \wedge (r \Rightarrow (v \Rightarrow u) \wedge w)$$

2. Use the shorter truth table method to show that the following is a tautology.

$$(p \Rightarrow q) \wedge (q \Rightarrow r) \Rightarrow (p \Rightarrow r)$$

Answer

$$(p \Rightarrow q) \wedge (q \Rightarrow r) \Rightarrow (p \Rightarrow r)$$

