Activity – Tautologies, Predicates, Quantifiers – Solutions

1) Show that the following conditional statement is a tautology by using a truth table.

- $(p \wedge q) \rightarrow p$

p	**q**	**(p ^ q)**	**(p ∧ q) → p**
T	T	T	T
T	F	F	T
F	T	F	T
F	F	F	T

2) "The message is scanned for viruses whenever the message was sent from an unknown system."

a) $\exists$ x: Student (S(x) ^ P(x) ^ ~Q(x))
b) $\forall$ x: Student (S(x) → **(**P(x) v Q(x)))

3)

a) true
b) true
c) false
d) false
e) true
f) false

4)

a) no counterexample exists
b) x = 0 is a counterexample

5)

a) $\forall$ x: Integer ((0 ≤ x < 9) → (a1[x] ≤ a1[x+1]))