Ujian Tengah Semester
Semester Gasal 2014/2015
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KUNCI JAWABAN REMIDI UTS MATDIS

1. The inhabitants of Joy Island consist of knights and knave. Knights always tell the truth while knaves always lie. You encounter two people *A* and *B*. Determine if possible, what *A* and *B* if they address you in the ways described: A says "The two of us are both knight" and *B* says "*A* is a knave."

A says "The two of us are both knight" and B says "A is a knave."
P(x): x is a knight
¬P(x): x is a knave

Suppose A is a knight.
P(A) ⇔ T
What A says must be true
P(A)∧P(B) ⇔ T
P(B) ⇔ T

Impossible

However, B says
¬P(A) ⇔ T
P(A) ⇔ F

A is a knave and what A says is false.
¬P(A) ⇔ T
P(A)∧P(B) ⇔ F ∧P(B) ⇔ F
B is a knight because his statement (A is a knave) is true.

Answer:
A is a knave.
B is a knight.

2. Show that *~p↔~q* s logically equivalent with *p↔q* by using Table of Equivalence Laws.

p↔q	≡~p↔~q
= (p→q) ∧ (q→p)	Definition of Bi conditional
= (~p∨q) ∧ (~q∨p)	Definition of Implication
= (p∨~q) ∧ (q ∨~p)	Commutative Law
= (~p→~q) ∧ (~q→~p)	Definition of Implication
=~p↔~q	≡~p↔~q

3. A) yes B) no C) no

4. Determine whether A x B x C is equivalent to (A x B) x C and explain why.
They aren't equivalent since the elements of A x B x C consist of 3 tuples (a, b, c) where a ∈ A, b ∈ B, and c ∈ C; whereas the elements of (A x B) x C look like ((a, b), c) – ordered pairs, the first coordinate is again an ordered pair.

5. Prove that if *x* and *y* are real numbers, then max(*x*, *y*) + min(*x*, *y*) = *x* + *y*.
If x<y, then max(x, y) + min(x, y) = y + x = x + y.
If x≥y, then max(x, y) + min(x, y) = x + y.
Because these are the only two cases, the equality always holds.