MID TEST

COURSE   : LOGIC AND SET

CLASS   : P MAT INTERNATIONAL 2011

DURATION   : 70 MENIT

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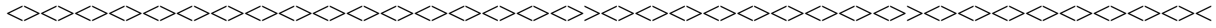
1. Make a truth table for this sentence : $(a \lor b \Rightarrow c) \Leftrightarrow (a \Rightarrow c)$ & $(b \Rightarrow c)$

2. Prove that it is a tautology without truth table :

    $:(a \Rightarrow (b \Rightarrow c)) \Rightarrow (a \& b \Rightarrow c)$

3. Prove that the following argument is valid by constructing a sentential derivation. (*not by reduction ad absurdum*).

    If Andi is a young man then anna is young woman. If Andi is a young man and anna is young woman then Budi is genius. If Andi is a young man and Budi is genius then Iwan is policeman. Budi is not genius or Iwan is not policeman. Therefore, Andi is not young man.

4. Prove that above argument is valid using *reduction ad absurdum* (RAA).

5. Write each sentence below using quantor:

    a). No students are lawyer

    b). Every people has money

    c). Anyone who likes flower is either senior or junior.

Good luck!

Key answer :

1.

a	b	c	a ∨ b	a ∨ b ⇒ c	a ⇒ c	b ⇒ c	a ⇒ c & b ⇒ c	a ∨ b ⇒ c ⇔ a ⇒ c & b ⇒ c
T	T	T	T	T	T	T	T	T
T	T	F	T	F	F	F	F	T
T	F	T	T	T	T	T	T	T
T	F	F	T	F	F	T	F	T
F	T	T	T	T	T	T	T	T
F	T	F	T	F	T	F	F	T
F	F	T	F	T	T	T	T	T
F	F	F	F	T	T	T	T	T

2. $(a \Rightarrow (b \Rightarrow c)) \Rightarrow (a \& b \Rightarrow c)$

$\Leftrightarrow \quad \neg (a \Rightarrow (b \Rightarrow c)) \vee (a \& b \Rightarrow c)$

$\Leftrightarrow \quad [a \& (b \& \neg c)] \vee [\neg a \vee \neg b \vee c]$

$\Leftrightarrow \quad [a \& b \& \neg c] \vee [\neg a \vee \neg b \vee c]$

$\Leftrightarrow \quad [a \& b \& \neg c] \vee \neg [a \& b \& \neg c]$

$\Leftrightarrow \quad p \vee \neg p$

$\Leftrightarrow \quad T$

3. p : Andi is a young man ;
   q : anna is young woman;
   r : Budi is genius
   s : Iwan is policeman

   1. $p \Rightarrow q$ premis

   2. $p \& q \Rightarrow r$ premis

   3. $p \& r \Rightarrow s$ premis

   4. $\neg r \vee \neg s$ premis

   5. $r \Rightarrow \neg s$

   6. $r \Rightarrow \neg p \vee \neg r$

   7. $p \Rightarrow \neg r$

   8. $p \Rightarrow \neg p \vee \neg q$

   4

   (3,4)

   (3,4)

   (2,3,4)

(2,3,4)	9. $p \Rightarrow \neg q$	
(1,2,3,4)	10. $(p \Rightarrow q) \& (p \Rightarrow \neg q)$	
(1,2,3,4)	11. $p \Rightarrow (q \& \neg q)$	
(1,2,3,4)	12. $p \Rightarrow F$	
(1,2,3,4)	13. $\neg p$	

4.

	1. $p \Rightarrow q$	premis
	2. $p \& q \Rightarrow r$	premis
	3. $p \& r \Rightarrow s$	premis
	4. $\neg r \vee \neg s$	premis
	5. p	add p
(1,5)	6. q	
(1,5)	7. $p \& q$	
(1,2,5)	8. r	
(1,2,5)	9. $p \& r$	
(1,2,3,5)	10. s	
(1,2,3,4,5)	11. $\neg r$	
(1,2,3,4,5)	12. $r \& \neg r$	
(1,2,3,4,5)	13. $p \Rightarrow (r \& \neg r)$	
(1,2,3,4,5)	14. $\neg p$.	

5. a. $(\forall x)(Sx \Rightarrow \neg Lx)$
    b. $(\forall x)(Px \Rightarrow Mx)$
    c. $(\forall x)(Fx \Rightarrow (Jx \vee Nx))$