CS 278 Lab 2

1.4.1 b) $(p \to q) \leftrightarrow (p \wedge \neg q)$

p	q	(...)
T	T	F
T	F	F
F	T	F
F	F	F

Contradiction

d) $(p \to q) \vee p$

p	q	(...)
T	T	T
T	F	T
F	T	T
F	F	T

Tautology

e) $(\neg p \vee q) \leftrightarrow (p \wedge \neg q)$

p	q	(...)	
T	T	T↔F	F
T	F	F↔T	F
F	T	T↔F	F
F	F	T↔F	F

Contradiction

1.4.2 a)

p	q	$p \leftrightarrow q$	$(p \to q) \wedge (q \to p)$
T	T	T	T ∧ T T
T	F	F	F ∧ T F
F	T	F	T ∧ F F
F	F	T	T ∧ T T

c)

p	q	$\neg p \to q$	$p \vee q$
T	T	T	T
T	F	T	T
F	T	T	T
F	F	F	F

1.4.5 b) $\neg j \to (l \vee \neg r)$ (1)

$(r \wedge \neg l) \to j$ (2)

j	l	r	(1)	(2)
T	T	T	F → T T	→ T T
T	T	F	F → T T	→ T T
T	F	T	F → F T	→ T T
T	F	F	F → T T	→ T T
F	T	T	T → T T	F → F T
F	T	F	T → T T	F → F T
F	F	T	T → F F	T → F F
F	F	F	T → T T	F → F T

1.4.5 c) $j \to \neg l$ (1)

$\neg j \to l$ (2)

j	l	(1)	(2)
T	T	F	T
T	F	T	T
F	T	T	T
F	F	T	F

Not logically equivalent

d) $(r \vee \neg l) \to j$ (1)

$j \to (r \wedge \neg l)$ (2)

r	l	j	(1)	(2)
T	T	T	T T	T T
T	T	F	F	F F
T	F	T	T T	T T
T	F	F	F	F F
F	T	T	T T	T T
F	T	F	F	F F
F	F	T	T T	T T
F	F	F	F	F F

Not logically equivalent

1.4.6 b) The applicant has written permission from his parents or is at least 18 years old.

$$p \vee q$$

Negate → $\neg(p \vee q)$

DeMorgans → $\neg p \wedge \neg q$

The applicant does not have written permission from his parents and is not at least 18 years old.