Minh Nguyen

4/2/2014

CS 225

Asn 1.3: 8, 14, 16, 20, 37

8)   a) Kwame will neither take a job in industry nor go to graduate school.

        b) Either Yoshiko doesn't know Java or he doesn't know calculus.

        c) James is not young or he is not strong.

        d) Rita will neither move to Oregon nor Washington.

14)   (¬p ^ (p --> q)) --> ¬q

                        == (¬p ^ (¬p ∨ q)) --> ¬q   ex. 3

                        == ¬(¬p ^ (¬p ∨ q)) ∨ ¬q   ex. 3

                        ==(¬(¬p) ∨ ¬(¬p ∨q)) ∨ ¬q   1st De Morgan law

                        ==(p ∨ (¬(¬p ∨ q)) ∨ ¬q   double negation law

                        == (p ∨(¬(¬p) ^ ¬q)) ∨ ¬q   2nd De Morgan law

                        == (p ∨ (p ^ ¬q)) ∨ ¬q   double negation law

                        == p ∨ ¬q   1st absorption law

        Truth value of p ∨ ¬q is either T or F, so (¬p ^ (p --> q)) --> ¬q is not tautological

16) show that p <-->q and (p ^ q) ∨ (¬p ^ ¬q) are equivalent.

p	q	P <--> q	(p ^ q)	¬p	¬q	(¬p ^ ¬q)	(p ^ q) ∨ (¬p ^ ¬q)
T	T	T	T	F	F	F	T
T	F	F	F	F	T	F	F
F	T	F	F	T	F	F	F
F	F	T	F	T	T	T	T

p <--> q is logical equivalence of (p ^ q) ∨ (¬p ^ ¬q) as they have the same truth values.

20)   ¬(p Φ q) and p <--> q

p	q	p Φ q	¬(p Φ q)
T	T	F	T
T	F	T	F
F	T	T	F
F	F	F	T

p	Q	p -> q	q -> p	p<-->q
T	T	T	T	T
T	F	F	T	F
F	T	T	F	F
F	F	T	T	T

They are logically equivalent as they have the same truth values.

32)   show that (p ^ q) -> r   and (p -> r) ^ (q -> r) are NOT equivalent.

        table for (p ^q) -> r

p	q	r	p ^ q	(p ^ q) -> r
T	T	T	T	T
T	T	F	T	F
T	F	T	F	T
T	F	F	F	T
F	T	T	F	T
F	T	F	F	T
F	F	T	T	T
F	F	F	T	F

        table for (p -> r) ^ (q -> r)

p	q	r	p -> r	q->r	(p -> r) ^ (q -> r)
T	T	T	T	T	T
T	T	F	F	F	T
T	F	T	T	T	T
T	F	F	F	T	F
F	T	T	T	T	T
F	T	F	T	F	F
F	F	T	T	T	T
F	F	F	T	T	T

that (p ^ q) -> r   and (p -> r) ^ (q -> r) are not equivalents as they do not have the same truth values.