Assignment 1.2

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8.

a) Kwame will not take a job in the industry nor will he go to graduate school.

b) Yoshiko does not know Java or Yoshiko does not know calculus

c) James is not young or James is not young

d) Rita will neither move to Oregon nor Washington

14. A tautology is a proposition that is always true

p	q	$\neg p$	$p \rightarrow q$	$\neg p \wedge (p \rightarrow q)$	$\neg q$	$(\neg q \wedge (p \rightarrow q)) \rightarrow \neg q$
F	F	T	T	T	T	T
F	T	T	T	T	F	F
T	F	F	F	F	T	T
T	T	F	T	F	F	T

So it is not a tautology because it is not always true.

16.

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

$= (p \vee (\neg p \wedge \neg q)) \wedge (q \vee (\neg p \wedge \neg q))$

$= ((p \vee \neg p) \wedge (p \vee \neg q)) \wedge ((q \vee \neg p) \wedge (q \vee \neg q))$

$= (T \wedge (p \vee \neg q)) \wedge (T \wedge (q \vee \neg p))$

$= (p \vee \neg q) \wedge (q \vee \neg p)$

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

$= p \leftrightarrow q$

They are equivalent

20.

p	q	$(p \oplus q)$	$\neg(p \oplus q)$
T	T	F	T
T	F	T	F
F	T	T	F
F	F	F	T

p	q	$p \rightarrow q$	$q \rightarrow p$	$p \leftrightarrow q$
T	T	T	T	T
T	F	F	T	F
F	T	T	F	F

F	F	T	T	T

They have the same truth table so therefore they are equivalent.

32.

Let p = true

q = false

r = false

then (p ^ q) → is true

and (p→r ^ (q→r) is false

Therefore, it is not equivalent.