Rohan S-R Merton Wk 3 - Formalisation in prop logic

3.1 P1: $P \to Q$ P: Jones arrives late R: nobody notices
C: $P \wedge R \to Q$ Q: Plane will wait

Yes, the argument is logically valid. If P alone implies Q then $P \wedge R$, a subset of P, must also imply Q.

P	Q	R	$P \to Q$	$P \wedge R \to Q$
			F_4 T F_3	? T_1 F F_2

3.2 i) $P_{44} \vee \neg(Q_3 \wedge \neg Q_3)$ ii) $P \wedge Q$
iii) $\neg R \wedge \neg(P_2 \leftrightarrow P_1)$

3.3 i)

A	R believes A
T	?
F	?

ii)

A	Knows A
T	?
F	F

iii) A not true

A	Knows A but not A
T	F
F	F

iv)

A	clairvoyant...
T	T
F	F

[I bet there's at least one account that says one can "know" a falsehood...]

↑ just a contradiction? from prev. truth table, can't know a thing that is false.

v)

A	B	A but B
T	T	T
T	F	F
F	T	F
F	F	F

just like AND, no?

vi)

A	B	Suppose A then B
T	T	?
T	F	F
F	T	F
F	F	F

e.g. A = Tuesday B = sunny

[equivalent to B because A?]

3.4 i) $P \to Q$ P: God can create soul w/out body. Q: Soul ≠ body
ii) $P \to Q$ P: interest rates rise Q: house prices crash
iii) $P \to Q$ P: boy (same person as general) Q: general can remember what he did as obey
or $\neg Q \to \neg P$
iv) $P \to Q$ P: I know the wall is yellow Q: I believe it's yellow

3.5) i) $P \wedge Q$ P: Russell wrote Principia Q: Whitehead wrote Principia

ii) $P \wedge Q$ P: Traffic light turned green Q: Bill pulled away

iii) $P \wedge Q$ P: Ben hates logic Q: Ben is a philosophy student

(*) 3.6. Let us assume "either ϕ or ψ" is an XOR, i.e. "either ϕ or ψ" $\leftrightarrow \neg(\phi \wedge \psi) \wedge (\phi \vee \psi)$. Then we have

①	$R \rightarrow \neg(P \wedge Q) \wedge (P \vee Q)$	P: Many at H's, Q: Many at S's
②	R	R: H and S's at the same time
③	$P_1 \rightarrow P$	P_1: H's are entertaining
④	$Q_1 \rightarrow P_1$	Q_1: S's are entertaining
⑤	$Q \rightarrow Q_1$	[I only seem to need 5 letters; on pg 43
ⓒ	$P \wedge \neg Q$	he suggests 7 are required]

The initial difficulty I noted in week 1 was that "nowhere does it say why more [students] at H than S, if both entertaining". This is true - but it's not necessary, given that our block of "many students" must be at either one or the other, and having them at S's would cause a contradiction.

From ② we we have it that $\neg(P \wedge Q) \wedge (P \vee Q)$. via modus ponens with ①. From ⑤, ④, ③, we get $Q \rightarrow P$, which in order to be true must have Q be false, given $\neg(P \wedge Q)$, and since $(P \vee Q)$, P must be true.

P	Q	P_1	Q_1	R	$R \rightarrow \neg(P \wedge Q) \wedge (P \vee Q)$	$P_1 \rightarrow P$	$Q_1 \rightarrow P_1$	$Q \rightarrow Q_1$	$P \wedge \neg Q$
				T	T_1 T T_3 F_7 F_6 T_{10} T_2 F_5 T_8 T_9	T_{13} T ?	T_{13} T T_{14}	T_{11} T T_{12}	F_4 F
				T	T_1 T_3 ? F_4 T_{14} T_2 T_5	T_{12} T T_{13}	T_{10} T T_{11}	T_8 T T_9	F F_6 T_7