A1

Friday, March 18, 2022 6:05 PM

1)

a	b	c	$\neg a$	$\neg b$	$a \wedge \neg b$	$(a \wedge \neg b) \leftrightarrow c$	$\neg a \rightarrow ((a \wedge \neg b) \leftrightarrow c)$
T	T	T	F	F	F	F	T
T	T	F	F	F	F	T	T
T	F	T	F	T	T	F	T
T	F	F	F	T	T	F	T
F	T	T	T	F	F	F	F
F	T	F	T	F	F	T	F
F	F	T	T	T	F	F	F
F	F	F	T	T	F	T	F

Neither, because the answer include True and False, that means in some conditions it goes ture, some condition goes false

2) $(P \wedge \neg(\neg P \wedge q)) \vee \neg(P \rightarrow r)$

$\equiv (P \wedge (P \vee \neg q)) \vee \neg(\neg P \vee r)$ by De Morgan's Law and Implication Law

$\equiv (P \wedge P) \vee (P \wedge \neg q) \vee (P \wedge \neg r)$ by Distributive Law

$\equiv P \vee P \wedge (\neg q \vee \neg r)$ by Idempotent Law and Distributive Law

$\equiv P \wedge (\neg q \vee \neg r)$ by Idempotent Law

$\equiv P$ by Absorption Law

3)

Contrapositive: if $2^n - 1$ is prime, then n is prime

Negation: n is not prime and $2^n - 1$ is Prime

4) i) $(S \wedge u) \vee t$

ii) $(\neg q \vee \neg t) \rightarrow r \wedge u$

iii) $\neg r \wedge q$

iv) $[(p \wedge r) \vee q) \vee ((S \wedge u) \vee t)$

v) $((\neg q \wedge p) \wedge r) \vee [(\neg t \wedge S) \wedge u)$