

Hw #4 propositional logic Jeremiah Webb

1A.

(-0.5) If The milk is not warm then the fridge must be working.

1B.

The fridge is not working ✓
and the milk is not warm. ✓

2A.

$$P \wedge (q \rightarrow r) \quad (-0.5)$$

2B.

$$\neg P \leftrightarrow \neg q \quad \checkmark$$

3A

| $(P \wedge q) \rightarrow r$ ✓ | | | |
|--------------------------------|---|---|--------------------------------|
| P | q | r | $(P \wedge q) \rightarrow r$ ✓ |
| F | F | F | T |
| F | F | T | T |
| F | T | F | T |
| F | T | T | T |
| T | F | F | T |
| T | F | T | T |
| T | T | F | F |
| T | T | T | T |

In the future you should have a column for each component in the argument (in this case one for $(p \wedge q)$).

3B

| P | Q | $(\neg P \leftrightarrow (P \vee \neg Q))$ |
|---|---|--|
| F | F | T |
| F | T | F |
| T | F | F |
| T | T | F |

Same comment as part a.

4A. Initial: $P \rightarrow \neg Q$

If you are studying, then you are not sleeping.

4B.

You are sleeping and you are studying.

4C

⊖ not

You are not sleeping or you are not studying.

5.

If you don't get the concept ⊖ or made a small mistake then you got the problem incorrect.

If you did not make a small mistake and you get the concept, then you do not get the math problem wrong.

6.

Some of my friends are not happy or all of my friends are not wealthy.

Technically: "Some of my friends are not happy or none are wealthy", but yours is grammatically correct.

7A

P: I am sick ✓

q: I am tired

7B.

I am sick or I am tired
and I am not tired then
I am sick.

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

7C.

| P | q | $P \vee q$ | $\neg q$ | $(P \vee q) \wedge \neg q$ | P | $(P \vee q) \wedge \neg q \rightarrow P$ |
|---|---|------------|----------|----------------------------|---|--|
| F | F | T | F | F | T | T |
| F | T | T | T | T | T | T |
| T | F | T | F | F | F | T |
| T | T | T | T | T | T | T |

7D.

This argument does make sense,
because the two tired statements
cancel out, the individual is always
sick.

✓ You can also say it's a tautology.