

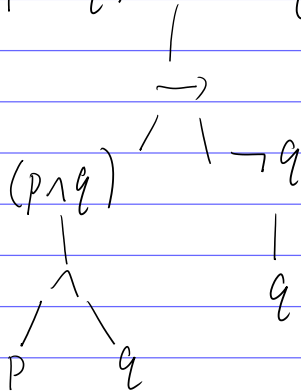
$$11. (p \rightarrow q) \vee (q \rightarrow p)$$

$$\langle p, q, p \rightarrow q, q \rightarrow p, (p \rightarrow q) \vee (q \rightarrow p) \rangle$$

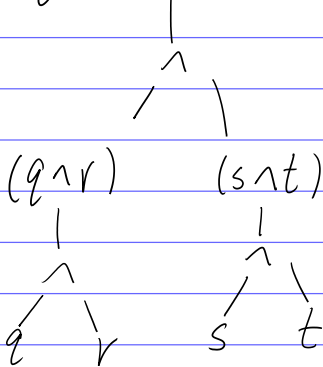
$$\neg \neg (p \vee \neg p)$$

$$\langle p, \neg p, p \vee \neg p, \neg (p \vee \neg p), \neg \neg (p \vee \neg p) \rangle$$

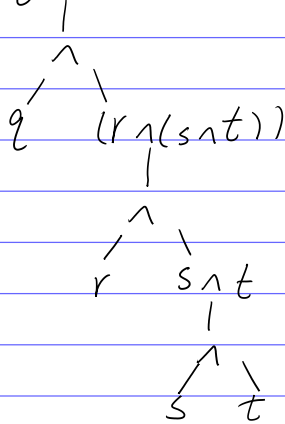
$$12. (p \wedge q) \rightarrow \neg q$$



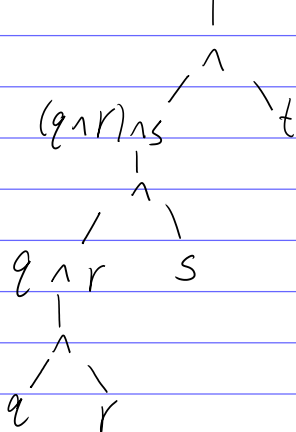
$$(q \wedge r) \wedge (s \wedge t)$$



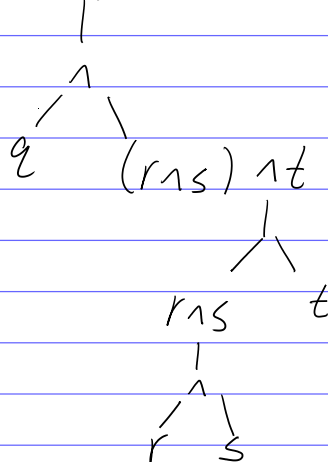
$$q \wedge (r \wedge (s \wedge t))$$



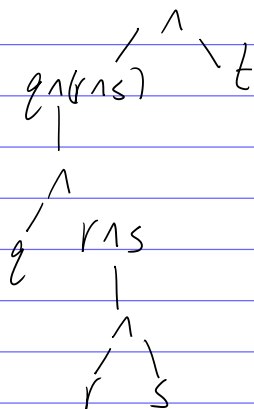
$$(((q \wedge r) \wedge s) \wedge t)$$



$$q \wedge ((r \wedge s) \wedge t)$$



$(q \wedge (r \wedge s)) \wedge t$



This ambiguity is OK. The truth value of this expression is the same in all these cases.

It makes sense because A and B and C and D is true IFF all of them are true. The order in this case doesn't matter.