

1.  $\begin{array}{l} -1 p \wedge q \rightarrow \neg r \\ -2 q \wedge t \end{array} \quad \vdash r \rightarrow \neg p$
2.  $\begin{array}{l} -1 p \rightarrow \neg q \wedge r \\ -2 r \rightarrow q \end{array} \quad \vdash p \rightarrow s$
3.  $\begin{array}{l} -1 p \wedge (q \rightarrow (p \rightarrow s)) \\ -2 p \rightarrow q \wedge r \end{array} \quad \vdash p \rightarrow s$
4.  $\begin{array}{l} -1 p \rightarrow q \\ -2 q \vee r \rightarrow s \\ -3 s \rightarrow (t \rightarrow m) \\ -4 p \wedge \neg \neg t \end{array} \quad \vdash m$
5.  $\begin{array}{l} -1 p \rightarrow (q \rightarrow r \wedge (s \vee t)) \\ -2 p \wedge (s \rightarrow m) \\ -3 q \wedge (t \rightarrow h \wedge n) \end{array} \quad \vdash m \vee h$
6.  $\begin{array}{l} -1 p \wedge q \rightarrow r \wedge s \\ -2 s \rightarrow q \wedge t \\ -3 s \wedge t \end{array} \quad \vdash p \rightarrow q \wedge r$
7.  $\begin{array}{l} -1 q \rightarrow s \\ -2 r \rightarrow s \wedge t \end{array} \quad \vdash p \rightarrow (q \vee r \rightarrow s)$
8.  $\begin{array}{l} -1 \neg p \rightarrow q \\ -2 \neg p \rightarrow \neg q \wedge s \end{array} \quad \vdash p$
9.  $\begin{array}{l} -1 p \vee (q \wedge r) \\ -2 t \vee q \neg \neg (p \rightarrow t) \end{array} \quad \vdash \neg (p \rightarrow t)$
10.  $\vdash (p \rightarrow q) \rightarrow [(q \rightarrow r) \rightarrow (p \rightarrow r)]$

$$11. \vdash \neg(p \wedge \neg p)$$

$$12. \begin{array}{l} -1 \ p \wedge q \rightarrow (r \rightarrow s) \\ -2 \ \neg s \wedge r \end{array} \quad \vdash p \rightarrow \neg q$$

$$13. \begin{array}{l} -1 \ p \rightarrow q \vee r \\ -2 \ q \rightarrow r \\ -3 \ r \rightarrow s \end{array} \quad \vdash p \rightarrow s$$

$$14. \begin{array}{l} -1 \ p \rightarrow \neg t \wedge s \\ -2 \ s \vee r \rightarrow t \end{array} \quad \vdash \neg p$$

$$15. \vdash \neg q \rightarrow \neg(p \wedge q)$$

$$16. \begin{array}{l} -1 \ t \rightarrow p \vee q \\ -2 \ p \rightarrow m \wedge s \\ -3 \ q \rightarrow \neg m \\ -4 \ s \vee \neg m \rightarrow \neg(p \vee q) \end{array} \quad \vdash \neg t$$

$$17. \begin{array}{l} -1 \ t \rightarrow p \vee q \\ -2 \ p \rightarrow n \wedge s \\ -3 \ q \rightarrow \neg n \end{array} \quad \vdash t \rightarrow s \vee \neg n$$

$$18. \vdash (p \wedge q) \vee (r \wedge s) \rightarrow [(p \vee r) \wedge (p \vee s)] \wedge [(q \vee r) \wedge (q \vee s)]$$

$$19. \vdash (p \rightarrow q) \wedge (q \rightarrow r) \rightarrow (p \rightarrow r)$$

$$20. \vdash (p \rightarrow q) \rightarrow (p \wedge r \rightarrow q \wedge r)$$

$$21. \vdash (p \rightarrow q) \rightarrow [(p \rightarrow r) \rightarrow (p \rightarrow q \wedge r)]$$

