Taller

1 Modus ponendo ponens

1.
(1) $p \vee q \to r$
(2) $p \vee q$
(3) r pp (1,2)

$$\frac{\begin{array}{l} p \vee q \to r \\ p \vee q \end{array}}{\therefore r \ pp\ (1,2)}$$

2.
(1) $\sim p \to \sim r$
(2) $\sim p$
(3) $\sim r$ pp (1,2)

$$\frac{\begin{array}{l} \sim p \to \sim r \\ \sim p \end{array}}{\therefore \sim r \ pp\ (1,2)}$$

3.
(1) $\sim p$
(2) $\sim p \to q$
(3) q pp (2,1)

$$\frac{\begin{array}{l} \sim p \to q \\ \sim p \end{array}}{\therefore q \ pp\ (2,1)}$$

4.
(1) $p \to q \wedge r$
(2) p
(3) $q \wedge r$ pp (1,2)

$$\frac{\begin{array}{l} p \to q \wedge r \\ p \end{array}}{\therefore q \wedge r \ pp\ (1,2)}$$

5.
(1) $p \to q \vee r$
(2) p
(3) $q \vee r$ pp (1,2)

$$\frac{\begin{array}{l} p - q \vee r \\ p \end{array}}{\therefore q \vee r \ pp\ (1,2)}$$

6.
(1) $\sim r$
(2) $\sim r \to q \wedge p$
(3) $q \wedge p$ pp (2,1)

$$\frac{\begin{array}{l} \sim r \to q \wedge p \\ \sim r \end{array}}{\therefore q \wedge p \ pp\ (2,1)}$$

2 Resuelva los siguientes ejercicios

a)
(1) $x \wedge y \to x + z$
(2) $x \wedge y$
(3) $x + z$ pp (1,2)

Si "x" es un número y "z" es un número, entonces x+z es un numero "x" es un numero y "z" es un numero

b)
(1) $x > y \wedge y > z \to x > z$
(2) $x > y \wedge y > z$
(3) $x > z$ pp (1,2)

Si x>y y y>z, entonces x>z. A la vez x>y y y>z.

c)
(1) $x = y \wedge y = z$
(2) $x = y \wedge y = z \to x = z$
(3) $x = z$ pp (2,1)

A la vez x=y y y=z, si x=y y y=z, entonces x=z

3 Demostrar la conclusión que se pide

Demostrar B

(1) $\sim G \to E$
(2) $E \to K$
(3) $\sim G$
(4) $K \to \sim L$
(5) $\sim L \to M$
(6) $M \to B$
(7) E pp (1,3)
(8) K pp (2,7)
(9) $\sim L$ pp (4,8)
(10) M pp (5,9)
(11) B pp (6,10)

$$\frac{\begin{array}{l} \sim G \to E \\ \sim G \end{array}}{\therefore E \ pp\ (1,3)}$$

$$\frac{\begin{array}{l} E \to K \\ E \end{array}}{\therefore K \ pp\ (2,7)}$$

$$\frac{\begin{array}{l} K \to \sim L \\ K \end{array}}{\therefore \sim L \ pp\ (4,8)}$$

$$\frac{\begin{array}{l} \sim L \to M \\ \sim L \end{array}}{\therefore M \ pp\ (5,9)}$$

$$\frac{\begin{array}{l} M \to B \\ M \end{array}}{\therefore B \ pp\ (6,10)}$$

Demostrar $R \lor S$

(1) $C \lor D$
(2) $C \lor D \to \sim F$
(3) $\sim F \to A \land \sim B$
(4) $A \land \sim B \to R \lor S$
(5) $\sim F$ pp (2,1)
(6) $A \land \sim B$ pp (3,5)
(7) $R \lor S$ pp (4,6)

$$\frac{\begin{array}{l} C \lor D \to \sim F \\ C \lor D \end{array}}{\therefore \sim F \quad \text{pp } (2,1)}$$

$$\frac{\begin{array}{l} \sim F \to A \land \sim B \\ \sim F \end{array}}{\therefore A \land \sim B \quad \text{pp } (3,5)}$$

$$\frac{\begin{array}{l} A \land \sim B \to R \lor S \\ A \land \sim B \end{array}}{\therefore R \lor S \quad (4,6)}$$

1 Modus tollendo tollens

1.

(1) $Q \to R$
(2) $\sim R$
(3) $\sim Q$ TT (1,2)

$$\frac{\begin{array}{l} Q \to R \\ \sim R \end{array}}{\therefore \sim Q \quad \text{TT } (1,2)}$$

2.

(1) $\sim P \to Q$
(2) $\sim Q$
(3) P TT (1,2)

$$\frac{\begin{array}{l} \sim P \to Q \\ \sim Q \end{array}}{\therefore P \quad \text{TT } (1,2)}$$

3.

(1) $R \to S$
(2) $\sim S$
(3) $\sim R$ TT (1,2)

$$\frac{\begin{array}{l} R \to S \\ \sim S \end{array}}{\therefore \sim R \quad \text{TT } (1,2)}$$

4.

(1) $Q \to \sim R$
(2) $\sim\sim R$
(3) $\sim Q$ TT (1,2)

$$\frac{\begin{array}{l} Q \to \sim R \\ \sim\sim R \end{array}}{\therefore \sim Q \quad \text{TT } (1,2)}$$

5.

(1) $P \to Q \land R$ P
(2) $\sim (Q \land R)$ P
(3) $\sim P$ TT (1,2)

$$\frac{\begin{array}{l} P \to Q \land R \ \text{P} \\ \sim (Q \land R) \ \text{P} \end{array}}{\sim P \quad \text{TT } (1,2)}$$

6.

(1) $P \lor Q \to R$ P
(2) $\sim R$ P
(3) $\sim (P \lor Q)$

$$\frac{\begin{array}{l} P \lor Q \to R \ \text{P} \\ \sim R \ \text{P} \end{array}}{\sim (P \lor Q) \quad \text{TT } (1,2)}$$

Del inciso A

1 Demostrar $\sim P$

(1) $P \rightarrow \sim Q$
(2) Q
(3) $\sim P$ TT (1,2)

$$\frac{P \rightarrow \sim Q \quad Q}{\therefore \sim P} \text{ TT } (1,2)$$

2 Demostrar $\sim A$

(1) $A \rightarrow \sim C$
(2) $B \rightarrow C$
(3) B
(4) C pp (2,3)
(5) $\sim A$ TT (1,4)

$$\frac{B \rightarrow C \quad B}{\therefore C} \text{ pp } (2,3) \qquad \frac{A \rightarrow \sim C \quad C}{\therefore \sim A} \text{ TT } (1,4)$$

3. Demostrar P

(1) $\sim P \rightarrow \sim Q$
(2) Q
(3) P TT (1,2)

$$\frac{\sim P \rightarrow \sim Q \quad Q}{\therefore P} \text{ TT } (1,2)$$

4. Demostrar A

(1) $\sim A \rightarrow \sim B$
(2) $\sim B \rightarrow \sim C$
(3) C
(4) B TT (2,3)
(5) A TT (1,4)

$$\frac{\sim B \rightarrow \sim C \quad C}{\therefore B} \text{ TT } (2,3) \qquad \frac{\sim A \rightarrow \sim B \quad B}{\therefore A} \text{ TT } (1,4)$$

5. Demostrar $\sim S$

(1) $P \rightarrow Q$
(2) $Q \rightarrow R$
(3) $S \rightarrow \sim R$
(4) P
(5) Q pp (1,4)
(6) R pp (2,5)
(7) $\sim S$ TT (3,6)

$$\frac{P \rightarrow Q \quad P}{\therefore Q} \text{ pp } (1,4) \qquad \frac{Q \rightarrow R \quad Q}{\therefore R} \text{ pp } (2,5) \qquad \frac{S \rightarrow \sim R \quad R}{\sim S} \text{ TT } (3,6)$$

6. Demostrar $\sim A$

(1) $A \to B$
(2) $B \to C$
(3) $C \to D$
(4) $\sim D$
(5) $\sim C$ TT (3,4)
(6) $\sim B$ TT (2,5)
(7) $\sim A$ TT (1,6)

$$\begin{array}{l} C \to D \\ \sim D \\ \hline \therefore \sim C \text{ TT } (3,4) \end{array}$$

$$\begin{array}{l} B \to C \\ \sim C \\ \hline \therefore \sim B \text{ TT } (2,5) \end{array}$$

$$\begin{array}{l} A \to B \\ \sim B \\ \hline \therefore \sim A \text{ TT } (1,6) \end{array}$$

Del inciso B

1 Demostrar $X = 0$

(1) $X \neq 0 \to X + y \neq y$
(2) $X + y = y$
(3) $X = 0$ TT (1,2)

$$\begin{array}{l} X \neq 0 \to X + y \neq y \\ X + y = y \\ \hline \therefore X = 0 \text{ TT } (1,2) \end{array}$$

2 Demostrar $X \neq 0$

(1) $X = 0 \to X \neq y$
(2) $X = z \to X = y$
(3) $X = z$
(4) $X = y$ pp(2,3)
(5) $X \neq 0$ TT(1,4)

$$\begin{array}{l} X = z \to X = y \\ X = z \\ \hline \therefore X = y \text{ pp } (2,3) \end{array}$$

$$\begin{array}{l} X = 0 \to X \neq y \\ X = y \\ \hline \therefore X \neq 0 \text{ TT } (1,4) \end{array}$$

3. Demostrar $X = y$

(1) $X \neq y \to X \neq z$
(2) $X \neq z \to X \neq 0$
(3) $X = 0$
(4) $X = z$ TT (2,3)
(5) $X = y$ TT (1,4)

$$\begin{array}{l} X \neq z \to X \neq 0 \\ X = 0 \\ \hline \therefore X = z \text{ TT } (2,3) \end{array}$$

$$\begin{array}{l} X \neq y \to X \neq z \\ X = z \\ \hline \therefore X = y \text{ TT } (1,4) \end{array}$$

4. Demostrar $X \neq 0$

(1) $X = y \to X = z$
(2) $X = z \to X = 1$
(3) $X = 0 \to X \neq 1$
(4) $X = y$
(5) $X = z$ pp (1,4)
(6) $X = 1$ pp (2,5)
(7) $X \neq 0$ TT (3,6)

$$\begin{array}{l} X = y \to X = z \\ X = y \\ \hline \therefore X = z \text{ pp } (1,4) \end{array}$$

$$\begin{array}{l} X = z \to X = 1 \\ X = z \\ \hline \therefore X = 1 \text{ pp } (2,5) \end{array}$$

$$\begin{array}{l} X = 0 \to X \neq 1 \\ X = 1 \\ \hline \therefore X \neq 0 \text{ TT } (3,6) \end{array}$$

5 Demostrar $x \neq y$

(1) $x = y \rightarrow y = z$
(2) $y = z \rightarrow \cancel{x} = w$
(3) $y = w \rightarrow y = 1$
(4) $y \neq 1$
(5) $y \neq w$ TT (3,4)
(6) $y \neq z$ TT (2,5)
(7) $x \neq y$ TT (1,6)

$$\begin{array}{l} y = w \rightarrow y = 1 \\ \underline{y \neq 1} \\ \therefore\ y \neq w \text{ TT } (3,4) \end{array}$$

$$\begin{array}{l} y = z \rightarrow y = w \\ \underline{y \neq w} \\ \therefore\ y \neq z \text{ TT } (2,5) \end{array}$$

$$\begin{array}{l} x = y \rightarrow y = z \\ \underline{y \neq z} \\ \therefore\ x \neq y \text{ TT } (1,6) \end{array}$$

6 Demostrar $x = 0$

(1) $x \neq 0 \rightarrow y = 1$
(2) $x = y \rightarrow y = w$
(3) $y = w \rightarrow y \neq 1$
(4) $x = y$
(5) $y = w$ pp (2,4)
(6) $y \neq 1$ pp (3,5)
(7) $x = 0$ TT (1,6)

$$\begin{array}{l} x = y \rightarrow y = w \\ \underline{x = y} \\ \therefore\ y = w \text{ pp } (2,4) \end{array}$$

$$\begin{array}{l} y = w \rightarrow y \neq 1 \\ \underline{y = w} \\ \therefore\ y \neq 1 \text{ pp } (3,5) \end{array}$$

$$\begin{array}{l} x \neq 0 \rightarrow y = 1 \\ \underline{y \neq 1} \\ \therefore\ x = 0 \text{ TT } (1,6) \end{array}$$

3 Modus tollendo ponens

1

(1) $\sim Q \vee R$
(2) $\sim R$
(3) $\sim Q$ (1,2)

$$\begin{array}{l} \sim Q \vee R \\ \underline{\sim R} \\ \therefore\ \sim Q \text{ TP } (1,2) \end{array}$$

2

(1) $T \vee (P \rightarrow Q)$
(2) $\sim T$
(3) $(P \rightarrow Q)$ TP(1,2)

$$\begin{array}{l} T \vee (P \rightarrow Q) \\ \underline{\sim T} \\ \therefore\ (P \rightarrow Q) \text{ TP } (1,2) \end{array}$$

3

(1) $\sim T \vee \sim R$
(2) $\sim\sim R$
(3) $\sim T$ TP (1,2)

$$\begin{array}{l} \sim T \vee \sim R \\ \underline{\sim\sim R} \\ \therefore\ \sim T \text{ TP } (1,2) \end{array}$$

4

(1) $P \vee Q$
(2) $\sim Q$
(3) P TP(1,2)

$$\begin{array}{l} P \vee Q \\ \underline{\sim Q} \\ \therefore\ P \text{ TP } (1,2) \end{array}$$

5

(1) $(S \wedge T) \vee R$
(2) $\sim (S \wedge T)$
(3) R TP (1,2)

$$\begin{array}{l} (S \wedge T) \vee R \\ \underline{\sim (S \wedge T)} \\ \therefore\ R \text{ TP } (1,2) \end{array}$$

6

(1) $(P \wedge Q) \vee S$
(2) $- S$
(3) $(P \wedge Q)$ TP (1,2)

$$\begin{array}{l} (P \wedge Q) \vee S \\ \underline{\sim S} \\ \therefore\ (P \wedge Q) \text{ TP } (1,2) \end{array}$$