1.1:

a, * Logic:

$((P \to Q) \wedge P) \to Q$ (*)

Ta có:

VT: $((P \to Q) \wedge P) \equiv (\bar{P} \vee Q) \wedge P$ (Luật kéo theo)

$\equiv (P \wedge \bar{P}) \vee (P \wedge Q)$ (Luật phân phối)

$\equiv 0 \vee (P \wedge Q)$ (Rút gọn)

$\equiv P \wedge Q$.

Xét (*) kết hợp VT:

$\Rightarrow (P \wedge Q) \to Q \equiv \overline{(P \wedge Q)} \vee Q$ (Luật kéo theo)

$\equiv (\bar{P} \vee \bar{Q}) \vee Q$ (Luật Demorgan)

$\equiv \bar{P} \vee (\bar{Q} \vee Q)$ (Luật kết hợp)

$\equiv \bar{P} \vee 1$

$\equiv 1$ (Luật thống trị)

b, * Logic:

$P \wedge Q \to P$.

Ta có: $P \wedge Q \to P \equiv \overline{(P \wedge Q)} \vee P$ (Luật kéo theo)

$\equiv (\bar{P} \vee \bar{Q}) \vee P$ (Demorgan)

$\equiv (\bar{P} \vee P) \vee \bar{Q}$ (kết hợp)

$\equiv 1 \vee \bar{Q}$ (Rút gọn)

$\equiv 1$.

c, * Logic:

$\neg(P \wedge Q) \wedge P \to \bar{Q}$ (*)

Ta có: VT: $\neg(P \wedge Q) \wedge P \equiv (\bar{P} \vee \bar{Q}) \wedge P$ (Demorgan)

$\equiv (P \wedge \bar{P}) \vee (P \vee \bar{Q})$ (phân phối)

$\equiv 0 \vee (P \vee \bar{Q})$

$\equiv P \vee \bar{Q}$

Từ (*) kết hợp VT $\Rightarrow (P \vee \bar{Q}) \to \bar{Q} \equiv \overline{(P \vee \bar{Q})} \vee \bar{Q}$

$\equiv (\bar{P} \vee Q) \vee \bar{Q} \equiv \bar{P} \vee (Q \vee \bar{Q})$

$\equiv P \vee 1. \equiv 1$

d, Logic:

(*) $((P \wedge Q) \leftrightarrow P) \rightarrow (P \rightarrow Q)$

Ta có:

$$\begin{aligned}
VT: ((P \wedge Q) \leftrightarrow P) &\equiv (P \wedge Q \rightarrow P) \wedge (P \rightarrow (P \wedge Q)) \\
&\equiv (\neg(P \wedge Q) \vee P) \wedge (\bar{P} \vee (P \wedge Q)) \\
&\equiv (\bar{P} \vee \bar{Q}) \vee P) \wedge ((\bar{P} \vee P) \wedge (\bar{P} \vee Q)) \\
&\equiv (\bar{P} \vee P) \vee \bar{Q}) \wedge (1 \wedge (\bar{P} \vee Q)) \\
&\equiv (1 \vee \bar{Q}) \wedge (\bar{P} \vee Q) \\
&\equiv 1 \wedge (\bar{P} \vee Q) \\
&\equiv \bar{P} \vee Q \\
&\equiv P \rightarrow Q \quad (\vee P)
\end{aligned}$$

1.7:

a)

$$\frac{(\overline{x_1} \vee x_2) \to x_3 \quad x_3 \to (x_4 \vee x_5) \quad \overline{x_4} \wedge \overline{x_6} \quad \overline{x_6} \to \overline{x_5}}{\therefore x_1} \equiv \frac{(\overline{x_1} \vee x_2) \to (x_4 \vee x_5) \quad \overline{x_5} \quad \left\{ \begin{array}{l} x_6 \to x_5 \\ \overline{x_6} \end{array} \right.}{\therefore x_1}$$

$$\equiv \frac{(\overline{x_1} \vee x_2) \to (x_4 \vee x_5) \quad \overline{x_4} \wedge \overline{x_5} \equiv \overline{x_4 \vee x_5}}{\therefore x_1}$$

$$\equiv \frac{\overline{\overline{x_1} \vee x_2}}{\therefore x_1} \equiv \frac{x_1 \wedge \overline{x_2}}{\therefore x_1} \equiv 1$$

b)

$$\frac{P \to ((Q \vee R) \wedge S) \quad P}{(Q \vee R) \wedge S}$$