

5.2

(a)

$$f(x, y) := (\bar{x} \Rightarrow \bar{y}) \wedge (\bar{x} \vee y)$$

x	y	$\bar{x} \Rightarrow \bar{y}$	$\bar{x} \vee y$	$f(x, y)$
0	0	1	1	1
0	1	0	1	0
1	0	1	0	0
1	1	1	1	1

$$f(x, y) = \bar{x}\bar{y} \vee xy$$

$$g(x, y, z) := ((x \Leftrightarrow \bar{z}) \oplus y) \oplus 1$$

x	y	z	$x \Leftrightarrow \bar{z}$	$(x \Leftrightarrow \bar{z}) \oplus y$	$g(x, y, z)$
0	0	0	0	0	1
0	0	1	1	1	0
0	1	0	0	1	0
0	1	1	1	0	1
1	0	0	1	1	0
1	0	1	0	0	1
1	1	0	1	0	1
1	1	1	0	1	0

$$g(x, y, z) = \bar{x}\bar{y}\bar{z} \vee x\bar{y}\bar{z} \vee x\bar{y}z \vee xy\bar{z}$$

(b)

$$f(x, y) = \bar{x}\bar{y} \vee xy = \overline{\bar{\bar{x}} \wedge \bar{\bar{y}} \wedge \bar{\bar{x}} \wedge \bar{\bar{y}}}$$

5.3

(a)

$$\begin{aligned} t_1(x, y, z) &:= \overline{(x \wedge (y \wedge z)) \vee (\bar{x} \wedge (\bar{y} \wedge \bar{z})) \vee ((x \vee \bar{y}) \wedge (x \vee \bar{z}))} \\ &= \overline{xyz \vee \bar{x}\bar{y}\bar{z} \vee (x \vee \bar{y})(x \vee \bar{z})} \\ &= \overline{xyz \vee \bar{x}\bar{y}\bar{z} \vee (x \vee x\bar{z} \vee x\bar{y} \vee \bar{y}\bar{z})} \\ &= \overline{x \vee \bar{y}\bar{z}} \\ &= \bar{x}(y \vee z) = \bar{x}y \vee \bar{x}z \end{aligned}$$

(b)

$$\begin{aligned}t_2(x, y, z, u) &:= \left(\left(\overline{(x \wedge y) \vee \bar{z}} \right) \vee \left(\overline{(\bar{x} \wedge \bar{z}) \vee (\bar{y} \wedge u)} \right) \right) \\ &= \left(\left(\overline{(x \wedge y)} \wedge z \right) \vee \left(\overline{(\bar{x} \wedge \bar{z})} \wedge (\bar{y} \wedge u) \right) \right) \\ &= \left((\bar{x} \vee \bar{y}) \wedge z \right) \vee \left((x \vee z) \wedge (\bar{y} \wedge u) \right) \\ &= \bar{x}z \vee \bar{y}z \vee x\bar{y}u \vee \bar{y}zu \\ &= z(\bar{x} \vee \bar{y} \vee \bar{y}u) \vee x\bar{y}u \\ &= \bar{x}z \vee \bar{y}z \vee x\bar{y}u\end{aligned}$$

5.4

S – Die Beschäftigten streiken

A – Die Arbeitsstundenzahl wird erhöht

G – Es gibt eine Gehaltserhöhung

$$[1] \quad \bar{S} \Rightarrow (G \Leftrightarrow A)$$

$$[2] \quad G \Rightarrow \bar{S}$$

$$[3] \quad A \Rightarrow \bar{G}$$

$$[4] \quad [1] \wedge [2] \wedge [3] \Rightarrow \bar{G}$$

$$[1] \quad \bar{S} \Rightarrow (G \Leftrightarrow A) = S \vee (G \Leftrightarrow A) = S \vee (GA \vee \bar{G}\bar{A}) = S \vee GA \vee \bar{G}\bar{A}$$

$$[2] \quad \bar{G} \vee \bar{S}$$

$$[3] \quad \bar{A} \vee \bar{G}$$

$$[4] \quad (S \vee GA \vee \bar{G}\bar{A}) \wedge (\bar{G} \vee \bar{S}) \wedge (\bar{A} \vee \bar{G}) \Rightarrow \bar{G}$$

A	S	G	[1]	[2]	[3]	[1] ∧ [2] ∧ [3]	[1] ∧ [2] ∧ [3] ⇒ \bar{G}
0	0	0	1	1	1	1	1
0	0	1	0	1	1	0	1
0	1	0	1	1	1	1	1
0	1	1	1	0	1	0	1
1	0	0	0	1	1	0	1
1	0	1	1	1	0	0	1
1	1	0	1	1	1	1	1
1	1	1	1	0	0	0	1

Folglich ist der Schluß, daß es keine Gehaltserhöhung gibt, korrekt.

5.5

$$\begin{aligned}
 G &= \overline{A}\overline{B}CD \vee \overline{A}B\overline{C}D \vee \overline{A}BC\overline{D} \vee \overline{A}BCD \vee A\overline{B}\overline{C}D \vee A\overline{B}C\overline{D} \\
 &\quad \vee A\overline{B}CD \vee AB\overline{C}D \vee ABC\overline{D} \vee ABCD \vee ABCD \\
 R &= \overline{A}\overline{B}\overline{C}\overline{D} \vee \overline{A}\overline{B}C\overline{D} \vee \overline{A}B\overline{C}\overline{D} \vee \overline{A}B\overline{C}D \vee \overline{A}B\overline{C}\overline{D} \vee \overline{A}B\overline{C}D \\
 &\quad \vee \overline{A}BC\overline{D} \vee \overline{A}BCD \vee A\overline{B}\overline{C}\overline{D} \vee A\overline{B}\overline{C}D \vee A\overline{B}C\overline{D}
 \end{aligned}$$

G		C, D				R		C, D			
		00	01	11	10			00	01	11	10
A, B	00	0	0	1	0	00	1	1	1	1	1
	01	0	1	1	1	01	1	1	0	1	1
	11	1	1	1	1	11	1	0	0	0	0
	10	0	1	1	1	10	1	1	0	1	1

$$\begin{aligned}
 G &= CD \vee AB \vee BC \vee AC \vee AD \vee BD \\
 R &= \overline{A}\overline{B} \vee \overline{C}\overline{D} \vee \overline{B}D \vee A\overline{D} \vee \overline{B}C \vee \overline{A}C
 \end{aligned}$$