Exercícios de Dedução Natural

Lógica para Computação

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1. $\vdash \forall x P(x) \rightarrow \neg \exists x \neg P(x)$
2. $\vdash \neg \exists x \neg P(x) \rightarrow \forall x P(x)$
3. $\vdash \exists x P(x) \rightarrow \neg \forall x \neg P(x)$
4. $\vdash \neg \forall x \neg P(x) \rightarrow \exists x P(x)$
5. $\vdash \forall x (P(x) \wedge Q(x)) \rightarrow (\forall x P(x) \wedge \forall x Q(x))$
6. $\vdash \forall x \forall y P(x, y) \rightarrow \forall y \forall x P(x, y)$
7. $\vdash \forall x (P \rightarrow Q(x)) \rightarrow (P \rightarrow \forall x Q(x))$, onde $x \notin VL(P)$
8. $\vdash \exists x (P(x) \vee Q(x)) \rightarrow (\exists x P(x) \vee \exists x Q(x))$
9. $\vdash \neg \forall x P(x) \rightarrow \exists x \neg P(x)$
10. $\vdash \exists x \neg P(x) \rightarrow \neg \forall x P(x)$
11. $\vdash \neg \exists x P(x) \rightarrow \forall x \neg P(x)$
12. $\vdash \forall x \neg P(x) \rightarrow \neg \exists x P(x)$
13. $\vdash \exists x (P(x) \wedge Q) \rightarrow (\exists x P(x) \wedge Q)$, onde $x \notin VL(Q)$
14. $\vdash (\exists x P(x) \wedge Q) \rightarrow \exists x (P(x) \wedge Q)$, onde $x \notin VL(Q)$
15. $\vdash \forall x (P(x) \vee Q) \rightarrow (\forall x P(x) \vee Q)$, onde $x \notin VL(Q)$
16. $\vdash (\forall x P(x) \vee Q) \rightarrow \forall x (P(x) \vee Q)$, onde $x \notin VL(Q)$
17. $\vdash \exists x (P(x) \rightarrow Q) \rightarrow (\forall x P(x) \rightarrow Q)$, onde $x \notin VL(Q)$
18. $\vdash (\forall x P(x) \rightarrow Q) \rightarrow \exists x (P(x) \rightarrow Q)$, onde $x \notin VL(Q)$
19. $\vdash \exists x (P \rightarrow Q(x)) \rightarrow (P \rightarrow \exists x Q(x))$, onde $x \notin VL(P)$
20. $\vdash (P \rightarrow \exists x Q(x)) \rightarrow \exists x (P \rightarrow Q(x))$, onde $x \notin VL(P)$
21. $\vdash \exists x (P(x) \rightarrow \forall x P(x))$
22. $\forall x \neg (P(x) \wedge \neg Q(x)), \forall x P(x) \models \forall x M(x)$
23. $\forall x \neg (P(x) \wedge \neg Q(x)), \neg \forall x Q(x) \models \neg \forall x P(x)$
24. $\forall x \neg (P(x) \wedge \neg Q(x)), \exists x \neg Q(x) \models \neg \forall x P(x)$
25. $\forall x \neg (P(x) \wedge \neg Q(x)), \exists x \neg Q(x) \models \exists x \neg P(x)$