LÓGICA PARA COMPUTAÇÃO

(EQUIVALÊNCIAS e REGRAS)

➢ Equivalências

1. $\alpha \wedge \alpha \equiv \alpha$
2. $\alpha \vee \alpha \equiv \alpha$
3. $\alpha \wedge \beta \equiv \beta \wedge \alpha$
4. $\alpha \vee \beta \equiv \beta \vee \alpha$
5. $(\alpha \wedge \beta) \wedge \delta \equiv \alpha \wedge (\beta \wedge \delta)$
6. $(\alpha \vee \beta) \vee \delta \equiv \alpha \vee (\beta \vee \delta)$
7. $\alpha \wedge (\beta \vee \delta) \equiv (\alpha \wedge \beta) \vee (\alpha \wedge \delta)$
8. $\alpha \vee (\beta \wedge \delta) \equiv (\alpha \vee \beta) \wedge (\alpha \vee \delta)$
9. $\alpha \rightarrow \beta \equiv \sim \alpha \vee \beta$
10. $\sim\sim \alpha \equiv \alpha$
11. $\alpha \leftrightarrow \beta \equiv (\alpha \rightarrow \beta) \wedge (\beta \rightarrow \alpha)$
12. $\sim(\alpha \wedge \beta) \equiv \sim\alpha \vee \sim\beta$
13. $\sim(\alpha \vee \beta) \equiv \sim\alpha \wedge \sim\beta$
14. $\sim(\alpha \rightarrow \beta) \equiv \alpha \wedge \sim \beta$
15. $\sim(\alpha \wedge \beta) \equiv \alpha \rightarrow \sim \beta$
16. $(\alpha \wedge \beta) \rightarrow \delta \equiv \alpha \rightarrow (\beta \rightarrow \delta)$
17. $\alpha \rightarrow \beta \equiv \sim \beta \rightarrow \sim\alpha$
18. $\alpha \rightarrow (\beta \wedge \delta) \equiv (\alpha \rightarrow \beta) \wedge (\alpha \rightarrow \delta)$
19. $(\alpha \vee \beta) \rightarrow \delta \equiv (\alpha \rightarrow \delta) \wedge (\beta \rightarrow \delta)$
20. $\alpha \wedge \mathbf{V} \equiv \alpha$
21. $\alpha \wedge \mathbf{F} \equiv \mathbf{F}$
22. $\alpha \vee \mathbf{V} \equiv \mathbf{V}$
23. $\alpha \vee \mathbf{F} \equiv \alpha$
24. $\alpha \wedge \sim\alpha \equiv \mathbf{F}$
25. $\alpha \vee \sim\alpha \equiv \mathbf{V}$
26. $(\alpha \wedge \beta) \vee \alpha \equiv \alpha$
27. $(\alpha \vee \beta) \wedge \alpha \equiv \alpha$
28. $\exists x\,(\alpha(x) \wedge \beta(x)) \equiv \sim \forall x\,(\alpha(x) \rightarrow \sim \beta(x))$
29. $\forall x\,(\alpha(x) \rightarrow \beta(x)) \equiv \sim\exists x\,(\alpha(x) \wedge \sim \beta(x))$
30. $\sim\exists x\,(\alpha(x) \wedge \beta(x)) \equiv \forall x\,(\alpha(x) \rightarrow \sim\beta(x))$
31. $\sim\forall x\,(\alpha(x) \rightarrow \beta(x)) \equiv \exists x\,(\alpha(x) \wedge \sim \beta(x))$
32. $\exists x\,\alpha(x) \equiv \sim \forall x \sim\alpha(x)$
33. $\forall x\,\alpha(x) \equiv \sim\exists x \sim\alpha(x)$
34. $\sim\exists x\,\alpha(x) \equiv \forall x \sim\alpha(x)$
35. $\sim\forall x\,\alpha(x) \equiv \exists x \sim\alpha(x)$

➢ Regras de Inferências

- **Modus ponendo Ponens-(MP)**

$$\frac{\alpha \rightarrow \beta \quad \alpha}{\beta}$$

- **Silogismo Disjuntivo-(SD)**

$$\frac{\alpha \vee \beta \quad \sim \alpha}{\beta} \qquad \text{ou} \qquad \frac{\sim\alpha \vee \beta \quad \alpha}{\beta}$$

- **Conjunção-(C)**

$$\frac{\alpha \quad \beta}{\alpha \wedge \beta}$$

- **Adição-(A)**

$$\frac{\alpha}{\alpha \vee \beta} \qquad \text{ou} \qquad \frac{\alpha}{\beta \vee \alpha}$$

- **Modus Tollendo Tollens-(MT)**

$$\frac{\alpha \rightarrow \beta \quad \sim \beta}{\sim \alpha}$$

- **Silogismo Hipotético-(SH)**

$$\frac{\alpha \rightarrow \beta \quad \beta \rightarrow \delta}{\alpha \rightarrow \delta}$$

- **Simplificação-(S)**

$$\frac{\alpha \wedge \beta}{\alpha} \quad \text{ou} \quad \frac{\alpha \wedge \beta}{\beta}$$

- **Instanciação Universal-(IU)**

$$\frac{\forall x\,\alpha(x)}{\alpha(\mathbf{a})} \quad (\mathbf{a}\text{- constante})$$

- **Instanciação Existencial-(IE)**

$$\frac{\exists x\,\alpha(x)}{\alpha(\mathbf{a})} \quad (\mathbf{a}\text{- constante})$$

- **Generalização Existencial-(GE)**

$$\frac{\alpha(\mathbf{a})}{\exists x\,\alpha(x)} \quad (\mathbf{a}\text{-constante})$$

- **Generalização Universal-(GU)**

$$\frac{\alpha(\mathbf{z})}{\forall x\,\alpha(x)} \quad (\mathbf{z}\text{-arbitrário})$$