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• Exercícios:

$$7) a) 5 \cdot 4 = 20 (P_e V)$$

$$b) 5 - 4 = 3 (P_e F)$$

$$c) 2 + 7 \cdot 3 = 5 \cdot 4 + 3 (P_e V)$$

$$d) 5(3 + 7) = 5 \cdot 3 + 5 \cdot 7 (P_e V)$$

$$e) 7 + 3 \neq 7 + 6 (P_o V)$$

$$f) (-2)^5 \geq (-2)^3 (P_o F)$$

$$g) 3 + 4 > 0 (P_e V)$$

$$h) 77 - 4 \cdot 2 (X)$$

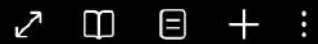
$$2) \begin{array}{l} 5 \cdot 4 = 20 V \\ 5 \cdot 4 \neq 20 F \end{array} \left. \begin{array}{l} \text{Proposição Negativa} \\ \text{falsa} \end{array} \right\}$$

$$b) \begin{array}{l} 3 \cdot (11 - 7) \neq 5 V \\ 3 \cdot (11 - 7) = 5 F \end{array} \left. \begin{array}{l} \text{Proposição Negativa} \\ \text{falsa} \end{array} \right\}$$

$$c) \begin{array}{l} 3 \cdot 2 + 7 > 4 V \\ 3 \cdot 2 + 7 \leq 4 F \end{array} \left. \begin{array}{l} \text{Proposição Negativa} \\ \text{falsa} \end{array} \right\}$$

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$$\begin{aligned} d) 5 \cdot 7 - 2 &\leq 5 \cdot 6 \quad F \\ 5 \cdot 7 - 2 &> 5 \cdot 6 \quad V \end{aligned} \left. \vphantom{\begin{aligned} 5 \cdot 7 - 2 &\leq 5 \cdot 6 \\ 5 \cdot 7 - 2 &> 5 \cdot 6 \end{aligned}} \right\} \begin{array}{l} \text{Proposição Negativa} \\ \text{Verdadeira } V \end{array}$$

$$\begin{aligned} e) \left(\frac{7}{2}\right)^7 &< \left(\frac{7}{2}\right)^3 \quad V \\ \left(\frac{7}{2}\right)^7 &> \left(\frac{7}{2}\right)^3 \quad F \end{aligned} \left. \vphantom{\begin{aligned} \left(\frac{7}{2}\right)^7 &< \left(\frac{7}{2}\right)^3 \\ \left(\frac{7}{2}\right)^7 &> \left(\frac{7}{2}\right)^3 \end{aligned}} \right\} \begin{array}{l} \text{Proposição Negativa} \\ \text{Falsa} \end{array}$$

$$\begin{aligned} f) \sqrt{2} &< 7 \quad F \\ \sqrt{2} &\geq 7 \quad V \end{aligned} \left. \vphantom{\begin{aligned} \sqrt{2} &< 7 \\ \sqrt{2} &\geq 7 \end{aligned}} \right\} \begin{array}{l} \text{Proposição Negativa} \\ \text{Verdadeira } V \end{array}$$

$$\begin{aligned} g) \neg(-9) &\geq 7 \quad F \\ -(-9) &\leq 7 \quad V \end{aligned} \left. \vphantom{\begin{aligned} \neg(-9) &\geq 7 \\ -(-9) &\leq 7 \end{aligned}} \right\} \begin{array}{l} \text{Proposição Negativa} \\ \text{Verdadeira } V \end{array}$$

h) $3/7 \rightarrow$ não é proposição

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• Exercício:

$$3) a) 3 > 7 \wedge 4 > 2 = V$$

$$b) 3 > 7 \vee 3 = 7 = V$$

$$c) 2/4 \vee 2/(4+7) = V$$

$$d) 3(5+2) = 3 \cdot 5 + 3 \cdot 2 \wedge 3/7 = F$$

$$e) \frac{7}{2} < \frac{3}{4} \vee 5/7 = F$$

$$f) (-7)^6 = -7 \wedge 2^3 < (-2)^5 = F$$

$$g) \sqrt{36} = 6 \vee \text{mdc}(4, 7) = 2 = F$$

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• Exercícios:

$$4) a) 2 - 7 = 7 \rightarrow 5 + 7 = 3 \cdot 4 = V$$

$$b) 2^2 = 4 \leftrightarrow (-2)^2 = 4 = V$$

$$c) 5 + 7 \cdot 7 = 70 \rightarrow 3 \cdot 3 = 9 = V$$

$$d) \text{mdc}(3, 6) = 7 \leftrightarrow 4 \text{ é prime} = V$$

$$e) 2 \mid 8 \rightarrow \text{mmc}(1, 8) = 2 = F$$

$$f) 6 \leq 2 \leftrightarrow 6 - 2 \geq 0 = F$$

$$g) \frac{3}{5} < \frac{2}{7} \rightarrow 3 \cdot 7 = 2 \cdot 5 = V$$

$$5) a) P \rightarrow R = F$$

$$b) P \rightarrow (\emptyset \vee R) = V$$

$$b) P \leftrightarrow \emptyset = V$$

$$g) \sim P \leftrightarrow \sim \emptyset = V$$

$$c) R \rightarrow P = V$$

$$h) \sim P \leftrightarrow R = V$$

$$d) (P \vee R) \leftrightarrow \emptyset = V$$

$$i) P = V \quad S = F$$

$$Q = V$$

$$e) P \rightarrow (\emptyset \rightarrow R) = F$$

$$R = F$$

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Exercícios:

7) a)

P	Q	$P \wedge Q$	$Q \wedge P$
V	V	V	V
V	F	F	F
F	V	F	F
F	F	F	F

$$\neg P \wedge Q \Leftrightarrow Q \wedge \neg P$$

↪ São equivalentes

$$(P \wedge Q) \wedge R \Leftrightarrow P \wedge (Q \wedge R)$$

^{2^3}

P	Q	R	$P \wedge Q$	$(P \wedge Q) \wedge R$	$Q \wedge R$	$P \wedge (Q \wedge R)$
V	V	V	V	V	V	V
V	V	F	V	F	F	F
V	F	V	F	F	F	F
V	F	F	F	F	F	F
F	V	V	F	F	V	F
F	V	F	F	F	F	F
F	F	V	F	F	F	F
F	F	F	F	F	F	F

↪ São equivalentes

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$$b) P \vee Q \Leftrightarrow Q \vee P$$

P	Q	$P \vee Q$	$Q \vee P$
V	V	V	V
V	F	V	V
F	V	V	V
F	F	F	F

São
equivalentes

$$(P \vee Q) \vee R \Leftrightarrow P \vee (Q \vee R)$$

$2^3 = 8$

P	Q	R	$P \vee Q$	$(P \vee Q) \vee R$	$Q \vee R$	$P \vee (Q \vee R)$
V	V	V	V	V	V	V
V	V	F	V	V	V	V
V	F	V	V	V	V	V
V	F	F	V	V	F	V
F	V	V	V	V	V	V
F	V	F	V	V	V	V
F	F	V	F	V	V	V
F	F	F	F	F	F	F

São equivalentes

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$$C \vee P \wedge (P \vee Q) \Leftrightarrow P$$

 $2^2 = 4$

P	Q	$P \vee Q$	$P \wedge (P \vee Q)$
V	V	V	V
V	F	V	V
F	V	V	F
F	F	F	F

→ são equivalentes

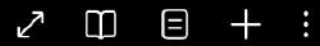
$$P \wedge (Q \vee R) \Leftrightarrow (P \wedge Q) \vee (P \wedge R)$$

 $2^3 = 8$

P	Q	R	$Q \vee R$	$P \wedge Q$	$P \wedge R$	$(P \wedge Q) \vee (P \wedge R)$
V	V	V	V	V	V	V
V	V	F	V	V	F	V
V	F	V	V	F	V	V
V	F	F	F	F	F	F
F	V	V	V	F	F	F
F	V	F	V	F	F	F
F	F	V	V	F	F	F
F	F	F	F	F	F	F

→ não são equivalentes

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$$d) \sim(\sim p) \Leftrightarrow p$$

p	$(\sim p)$	$\sim(\sim p)$
V	F	V
F	V	F

Se são equivalentes

$$\sim(p \wedge q) \Leftrightarrow \sim p \vee \sim q$$

p	q	$(p \wedge q)$	$\sim(p \wedge q)$	$\sim p \vee \sim q$
V	V	V	F	F
V	F	F	V	V
F	V	F	V	V
F	F	F	V	V

Se são equivalentes



• Exercícios:

$$8) a(\exists x) x^2 - 5x + 9 = 0$$

$$b) (\forall a) (a + 7)(a - 7) = a^2 - 7$$

$$c) (\exists y) \left(\frac{y}{3} + \frac{y}{9} \neq \frac{y}{7} \right)$$

$$d) (\forall m) (\sqrt{m^2 + 9} \neq m + 3)$$

$$e) (\forall x) (-(-x) = x)$$

$$f) (\exists a) (5a + 9 \leq 11)$$

$$g) (\forall y) (\sqrt{y^2} = y)$$

$$h) (\forall a) \left(\frac{a^2 - a}{a} = a - 1 \right)$$



• Exercícios:

$$a) \text{mdc}(2,3) \neq 1 \text{ e } \text{mmc}(2,3) = 6$$

$$b) \frac{2}{3} \neq \frac{6}{10} \text{ e } 3 \cdot 10 = 6 \cdot 5$$

$$c) \frac{3}{7} > 1 \text{ ou } -3 < -7$$

$$d) 2^2 = 4 \wedge \sqrt{4} \neq 2$$

$$e) (-3)^2 = 9 \wedge \sqrt{9} = -3$$

$$f) 2 \leq 5 \wedge 3^2 < 5^2$$

$$g) (\exists x) (x > 2 \wedge 3^x \leq 3^2)$$

$$h) (\forall x) (\sqrt{x} \geq 0)$$

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• Exercícios

70a) F

b) F

c) V

d) F

e) F

f) F

g) F

h) V