Lista 03

2) a) $(p \wedge \sim p) \to q \equiv V$
$F \to q \equiv V$
equivalente $V \equiv V$

b) $(\sim p \to p) \equiv p$
$\sim p \vee p$
$\sim q \equiv V$
$p \vee p$ idempotência
equivalente $p \equiv p$

c) $p \to (p \wedge q) \equiv p \to q$
$\sim p \vee (p \wedge q) \equiv \sim p \vee q$
$(\sim p \vee p) \wedge (\sim p \vee q) \equiv \sim p \vee q$
$V \wedge (\sim p \vee q)$
$\sim p \vee q \equiv p \to q$
equivalente

d) $(p \to q) \to q \equiv p \vee q$
$(\sim p \vee q) \to q \equiv p \vee q$
$\sim (\sim p \vee q) \vee q$
$(p \wedge \sim q) \vee q$
$(p \wedge q) \wedge (A \cup C)$
$(A \cup B) \wedge (A \cup C)$
$(q \vee q) \wedge (q \vee p)$
$V \wedge (q \vee p)$
$q \vee p \equiv p \vee q$
equivalente

e) $(p \to q) \wedge (q \to r) \equiv p \wedge q \equiv \sim (\sim p \wedge q) \wedge r$
$(\sim p \vee q) \wedge (\sim q \vee r) \equiv (p \wedge q) \to$ distributiva
$\sim (\sim p \wedge q) \to$ morgan
$\sim \sim p \wedge q \equiv \sim (p \wedge q) \vee r$
$\sim (\sim p \wedge q) \equiv \sim (p \wedge q) \vee r$
equivalente

f) $(p \to r) \wedge (q \to r) \equiv p \vee q \to r$
$(\sim p \vee r) \wedge (\sim q \vee r) \equiv \sim (p \vee q) \vee r$
$\sim r \vee (p \wedge q)$
$\sim r \vee \sim (p \vee q)$
$\sim (p \vee q) \vee r \equiv \sim (p \vee q) \vee r$
equivalente

g) $(p \to q) \wedge (p \to r) \equiv p \to (q \wedge r)$
$(\sim p \vee q) \wedge (\sim p \vee r)$
$\sim p \vee (q \wedge r)$
$\sim \sim p \vee q \wedge r$
$p \to (q \wedge r) \equiv p \to (q \wedge r)$
equivalente

3) a) a) $\sim (\sim p \to q) \equiv \sim p$
$\sim (\sim p \vee q) \to p$
$\sim p \vee q \to q$
$\sim \sim p \vee q \vee p$
$p \wedge \sim q \vee p$
$(p \vee q \vee p \wedge \sim q) \vee p$
$(p \vee p) \wedge q$
$p \wedge q$

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

c) $\sim [(p \vee q) \wedge \sim p]$
$(A \wedge B) \vee (A \wedge C)$
$(\sim p \wedge q \vee \sim p \wedge p)$
$(\sim p \wedge q) \vee F$
$\sim p \wedge q$
$(\sim p \wedge q)$