

4.

$$(8) X \& \& (X ==> Y) = X \& \& Y$$

Rezolvare:

Luam partea stanga:

$$X \& \& X \rightarrow X \& \& Y =$$

$$1 \rightarrow X \& \& Y =$$

$X \& \& Y$  care e egal cu  $X \& \& Y$

$$(9) X ==> Y = !Y ==> !X$$

Rezolvare:

Stanga:

$$X ==> Y =$$

$$!X || Y (*)$$

Dreapta:

$$!Y ==> !X$$

$$! !Y || !X =$$

$$Y || !X =$$

$$!X || Y (**)$$

Din \* si \*\* rezulta echivalenta

$$(10) X \& \& Y ==> Z = X ==> !Y || Z$$

Stanga:

$$!(X \& \& Y) || Z =$$

$$!X || !Y || Z =$$

$$!X || (!Y || Z) =$$

$$X \rightarrow (!Y || Z)$$

$$(a) X || (!X ==> Y) = X || Y$$

Stanga:

$$X || (!X \rightarrow Y) =$$

$$X || (X || Y) =$$

$$X || X || Y =$$

$$X || Y.$$

$$(b) X ==> (Y \& \& Z) = (X ==> Y) \& \& (X ==> Z)$$

Stanga:

$$X \rightarrow Y \ \&\& Z =$$

Se distribuie  $\rightarrow$ :

$$(X \rightarrow Y) \ \&\& (X \rightarrow Z)$$

3.

$$(5) \ X \parallel (Y \ \&\& Z) = (X \parallel Y) \ \&\& (X \parallel Z)$$

Stanga:

$$\neg X \rightarrow (Y \ \&\& Z) =$$

$$\neg X \rightarrow Y \ \&\& \neg X \rightarrow Z =$$

$$X \parallel Y \ \&\& X \parallel Z$$

5.

$$(P(x) \ \&\& Q(y) \implies R(x, y)) \ \&\& \neg R(x, y) \ \&\& P(x) \implies \neg Q(y) =$$

$$(\neg (P(x) \ \&\& Q(y)) \parallel R(x, y)) \ \&\& \neg R(x, y) \ \&\& P(x) \implies \neg Q(y) =$$

$$(\neg P(x) \parallel \neg Q(y) \parallel R(x, y)) \ \&\& \neg R(x, y) \ \&\& P(x) \implies \neg Q(y) =$$

$$\neg (\neg P(x) \parallel \neg Q(y) \parallel R(x, y)) \parallel \neg R(x, y) \parallel \neg P(x) \parallel \neg Q(y) =$$

$$\neg (\neg P(x) \parallel \neg Q(y) \parallel R(x, y)) \parallel R(x, y) \parallel \neg P(x) \parallel \neg Q(y) =$$

$$(P(x) \ \&\& Q(y) \ \&\& \neg R(x, y)) \parallel R(x, y) \parallel \neg P(x) \parallel \neg Q(y) =$$

$$[(P(x) \parallel R(x, y)) \ \&\& (Q(y) \parallel R(x, y)) \ \&\& (\neg R(x, y) \parallel R(x, y))] \parallel \neg P(x) \parallel \neg Q(y) =$$

$$[(P(x) \parallel R(x, y)) \ \&\& (Q(y) \parallel R(x, y)) \ \&\& \text{true}] \parallel \neg P(x) \parallel \neg Q(y) =$$

$$[(P(x) \parallel R(x, y) \parallel \neg P(x)) \ \&\& (Q(y) \parallel R(x, y) \parallel \neg P(x))] \parallel \neg Q(y) =$$

$$[(\text{true} \parallel R(x, y)) \ \&\& (Q(y) \parallel R(x, y) \parallel \neg P(x))] \parallel \neg Q(y) =$$

$$(Q(y) \parallel R(x, y) \parallel \neg P(x)) \parallel \neg Q(y) =$$

$$Q(y) \parallel R(x, y) \parallel \neg P(x) \parallel \neg Q(y) =$$

$$\text{True} \parallel R(x, y) \parallel \neg P(x) =$$

True.