Outline

Exercise 1 (problem 1)

The following formula has its parentheses removed. Restore the parentheses.

$$\neg p_1 \to \neg\neg p_2 \leftrightarrow p_3 \wedge p_4.$$

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Connective	Name	Priority
$\top$	verum	
$\bot$	falsum	
$\neg$	negation	4
$\wedge$	conjunction	3
$\vee$	disjunction	3
$\to$	implication	2
$\leftrightarrow$	equivalence	1

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$$\neg p_1 \to \neg\neg p_2 \leftrightarrow p_3 \land p_4.$$

$$(\ \neg p_1 \ \to\ \neg\ \neg p_2\ ) \leftrightarrow (p_3 \land p_4)$$

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$\top$	verum	
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The following formula has its parentheses removed. Restore the parentheses.

$$\neg p_1 \rightarrow \neg\neg p_2 \leftrightarrow p_3 \wedge p_4.$$

$$((\neg p_1) \rightarrow (\neg\ \neg p_2\ )) \leftrightarrow (p_3 \wedge p_4)$$

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$\top$	verum	
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The following formula has its parentheses removed. Restore the parentheses.

$$\neg p_1 \to \neg\neg p_2 \leftrightarrow p_3 \wedge p_4.$$

$$((\neg p_1) \to (\neg(\neg p_2))) \leftrightarrow (p_3 \wedge p_4)$$

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$\top$	verum	
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Exercise 1 (problem 2)

Show that the formulas $p \to (q \to r)$ and $(p \to q) \to r$ are not equivalent by finding an interpretation in which they have different truth values.

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Take the interpretation $I_1 = \{p \mapsto 0, q \mapsto 0, r \mapsto 0\}$. We have

$$I_1(p \to (q \to r)) = 1;$$
$$I_1((p \to q) \to r)) = 0.$$

Exercise 1 (problem 2)

Show that the formulas $p \to (q \to r)$ and $(p \to q) \to r$ are not equivalent by finding an interpretation in which they have different truth values.

Another solution is the interpretation $I_2 = \{p \mapsto 0, q \mapsto 1, r \mapsto 0\}$. We have

$$I_2(p \to (q \to r)) = 1;$$
$$I_2((p \to q) \to r)) = 0.$$