

Math 387 Assignment 2

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Distributed Jan 23; due Jan 30. Typo in problem 1 corrected Jan 26.

1. Write up a formal proof in natural deduction style of

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

2. Write up a formal proof in natural deduction style of

$$\neg(P \rightarrow Q) \leftrightarrow P \wedge \neg Q$$

3. Convert the expressions $(P \vee Q) \rightarrow R$ and $(P \rightarrow R) \wedge (Q \rightarrow R)$ to boolean algebra and show that they are logically equivalent by calculation in boolean algebra.
4. The same as the previous problem, but using mod 2 arithmetic instead of boolean algebra.
5. Determine the duals of other logical operations than \neg , \wedge and \vee : what are the duals of \rightarrow , \leftrightarrow and \oplus ?