
Math 307
Review for Midterm Exam #1

The exam will cover the material from the first three homeworks. The best thing you can do to prepare for the exam is to study these homeworks and make sure you know how to do all of the problems. The following is an overview of what we have been talking about for the first four weeks of the course:

- (1) Symbolic logic proofs. You should know the basic rules (MP, MT, RCS, LCS, CI, MPB, SI, etc.) and be able to use them in proofs. You should know how to construct truth tables, and know how to identify and verify tautologies. You should be able to correctly use the Deduction Theorem and Indirect Inference. Finally, you should know (and be able to use) the following tautologies:

$$\begin{aligned}\sim [P \wedge Q] &\iff [\sim P \vee \sim Q] \\ \sim [P \vee Q] &\iff [\sim P \wedge \sim Q] \\ \sim [P \Rightarrow Q] &\iff [P \wedge \sim Q], \\ [P \vee Q] &\iff [\sim P \Rightarrow Q], \\ P \Rightarrow [P \vee Q].\end{aligned}$$

- (2) Quantifiers. You should be able to construct expressions involving the two quantifiers “for all” and “there exists”, and you should be able to identify whether such expressions are true or false. You should know the rules for negating statements with quantifiers. You should be able to identify and use basic routines with quantifiers (IU, EI, IE).
- (3) Set notation. You should be able to use and analyze set-builder notation (e.g., $\{x \mid P(x)\}$), set roster notation (e.g., $\{5, 3, 2, a, 7, x\}$), set intersections, set unions, and subset relations.
- (4) You should understand how to do basic arithmetic and algebra in \mathbb{Z}_n . Given n , you should be able to identify which elements in \mathbb{Z}_n have multiplicative inverses, and use the Euclidean Algorithm to find these inverses.