

Newberger: Math 233, Spring 2004

Worksheet: Tautologies

Please refer to Section 1.4 of *Structures and Proofs*. You do not need to copy out the questions, but answer the following exercises in sentences, so that it is not necessary to read the questions to understand what you have written.

- (1) Read page 18, #18 carefully. If you do not remember what sentential form means, look it up in the index of *Structures and Proofs* to find the explanation again. Never let yourself not understand what you are reading. Be prepared to reread mathematical explanations several times. Refer back to definitions and explanations as often as necessary!
- (2) (10 points) Tautology is a new vocabulary word. When you learn a new vocabulary word, it helps to consider some examples, to better understand how it fits in with what you know. In page 18, #18, it says that the sentential form $P \vee \sim P$ is a tautology. Answer the following questions using sentences.
 - To better understand tautologies, give an example of a statement P in English and the resulting statement $P \vee \sim P$. (Your answer should be something like “Let P be the statement...” followed by “Then $P \vee \sim P$ corresponds to the statement...”)
 - Write the truth table for $P \vee \sim P$. (Label your table. For example, you could write: “This is the truth table for the statement $P \vee \sim P$.”)
 - Write a few sentences that explain how you can tell that the sentential form $P \vee \sim P$ is a tautology by looking at the truth table.
- (3) (10 points) Do page 18 #18. Be sure to explain in complete sentences whether or not the given sentential forms are tautologies, and how you can tell in each case.