

Math 220, Section 203—Homework #1
due in class Thursday, January 16, 2003

- I. D'Angelo and West, p. 45, #2.10(a)–(d), (g)–(h)
- II. D'Angelo and West, p. 46, #2.19. There might be more than one reasonable interpretation; just choose one you think is right and go with it.
- III. D'Angelo and West, p. 46, #2.21
- IV. D'Angelo and West, p. 49, #2.48
- V. Write the negative of each of the following statements. All of your answers should end with “he/she does not dance to that song.”
 - (a) There is a song such that, for every person, he/she dances to that song.
 - (b) For every person, there is a song such that he/she dances to that song.
 - (c) There is a person such that, for every song, he/she dances to that song.
 - (d) For every song, there is a person such that he/she dances to that song.
- VI. Which of the four statements (a)–(d) in Problem IV imply which of the others? In other words, list all the pairs of statements for which, whenever the first one is true, the second one is automatically true.
- VII. Consider the following statement about how to be warm enough in the winter: “You must either wear a heavy coat, or else wear both a light jacket and a vest, or else drink lots of hot coffee and wear a long-sleeve shirt or a sweater.” Convert this into an equivalent statement about how to not be warm enough in the winter.
- VIII. Consider the following four statements that might be found in the fine print:
 - (a) If the original receipt is included, then whenever the package is unopened, the item is under warranty.
 - (b) If whenever the original receipt is included, the package is unopened, then the item is under warranty.
 - (c) The original receipt is included, and either the package has been opened or the item is under warranty.
 - (d) Either the original receipt is included and the package has been opened, or the item is under warranty.

Two of these statements are logically equivalent. Decide which two, write them in logical notation, and prove that they are logically equivalent. (Using truth tables is one way; Examples 2.14 and 2.19-2.20 might suggest an alternative.) Use R to stand for the statement “The original receipt is included”, U to stand for “The package is unopened”, and W to stand for “The item is under warranty”.