

Math 129 – Spring 05 02/11/2005
Symbolic Logic

1. Symbolic Form.

Consider the following simple statements

p: the temperature is 90°

q: the air conditioning is working

r: the apartment is hot

Translate each of the following statements to symbolic form

- a) The air conditioning is working, or the temperature is 90° and the apartment is hot.
- b) The temperature is 90° or the air conditioning is not working, and the apartment is hot.
- c) If the temperature is 90° and the air conditioning is working then the apartment is not hot.
- d) It is false that the apartment is hot and the air conditioning is not working.
- e) Use De Morgan's Laws to rewrite the last statement symbolically and then in words.

2. Truth Table

- a) Construct a truth table for the statement

“Alice is in the office, and she is not at her desk or she is sleeping”

- b) Assume that Alice is not home, that Alice is at her desk and that Alice is sleeping. Is the compound statement above true or false?
- c) Indicate three different ways in which that compound statement would be false.

3. Obtaining a Loan.

Read the given requirements for obtaining a loan. Identify which of the following applicants will qualify for it. If an applicant does not qualify, explain why.

To qualify for a loan of \$40,000, an applicant must have a gross income of at least \$28,000 if single or \$46,000 combined income if married, and assets of at least \$6,000.

- a) Mr. Johns, married with 3 children, makes \$42,000 a year. Mrs. Johns does not have an income. They have assets of \$35,000.
- b) Ms. Duncan is single, earns \$31,000 working as a teacher. She owns a car valued at \$10,000.
- c) Mr. Peters has an income of \$ 35,000, his wife earns \$15,000 working part time. They have total assets of \$25,000.