

Name: _____

Directions: All questions require explanation in English sentences.

1. [4 points] Consider the statement “I bike to work only if it is sunny.” For each of the following situations, decide whether the given statement is true or false.

(a) It is sunny and I bike to work.

(b) It is sunny and I do not bike to work.

(c) It is not sunny and I bike to work.

(d) It is not sunny and I do not bike to work.

2. [1 point] Express the statement “I bike to work only if it is sunny” as a traditional implication of the form “If A, then B”.

3. [5 points] Consider the following equation: $y^2 = x^2 + 1$ (*). Decide whether the following statements are true or false. Justify your answers.

(a) For each real number x , there exists a real number y such that the pair x, y satisfies (*).

(b) For each real number y , there exists a real number x such that the pair x, y satisfies (*).

(c) There exists a real number x such that for each real number y , the pair x, y satisfies (*).

(d) There exists a real number y such that for each real number x , the pair x, y satisfies (*).

(e) If x, y is a pair of real numbers satisfying (*), then $y > x$.