

## Workshop Problems 1

**Problem 1.** Consider the following proposition: "For all nonnegative real numbers  $x$  and  $y$  with  $x^2 \geq y^2$ , we have  $x \geq y$ ."

- a. Identify statements A and B so that this proposition may be written as "If A then B."
- b. Work backward from statement B by one step. That is, obtain a statement B1 so that if B1 is true then B is true.
- c. Work forward from statement A by one step. That is, obtain a statement A1 so that if A is true then A1 is true.
- d. By repeating parts (b) and (c) (in any order that you like), provide a proof of the proposition. Write your proof in complete sentences.

**Problem 2.** Consider the proposition "If  $a$  and  $b$  are nonnegative real numbers then  $(a + b)/2 \geq \sqrt{ab}$ ."

- a. Identify statements A and B so that the proposition can be written "A implies B."
- b. Use Problem 1 to work backward from statement B by one step.
- c. Work forward from statement A by one step.
- d. Prove the proposition.

**Problem 3.** Consider the proposition: "For any odd number  $n$ ,  $n^2$  is also odd".

- a. Identify statements A and B so that this proposition can be written as "If A then B."
- b. Work backward from statement B by one step.
- c. Work forward from statement A by one step.
- d. Prove the proposition.