Introduction to Abstract Mathematics
Fall 2018

Assignment 2.2
Due September 5

Exercise 1. Express the following statements symbolically.

a. If anyone in the dorm has the measles, then everyone who has a friend in the dorm will have to be quarantined.

b. If nobody failed the test, then everyone who got an A will tutor someone who got a D.

c. If anyone can do it, Jones can.

d. If Jones can do it, anyone can.

Exercise 2. Translate the following symbolic statements into English sentences.

a. $(\forall x \in \mathbb{N})[(P(x) \wedge \neg(x = 2)) \Rightarrow O(x)]$, where $P(x)$ means "x is a prime number" and $O(x)$ means "x is odd."

b. $(\exists x \in \mathbb{N})[P(x) \wedge (\forall y \in \mathbb{N})(P(y) \Rightarrow y \leq x)]$, where $P(x)$ means "x is a perfect number."

Exercise 3. Are these statements true or false? You may assume all variables belong to the set of all people, and $P(x, y)$ means "x is a parent of y."

a. $\exists x \forall y P(x, y)$

b. $\forall x \exists y P(x, y)$

c. $\neg \exists x \exists y P(x, y)$

d. $\exists x \neg \exists y P(x, y)$

e. $\exists x \exists y \neg P(x, y)$

Exercise 4. Consider the following statements:

$A =$ "You can fool all of the people some of the time."
$B =$ "You can fool some of the people all of the time."
$C =$ "You can't fool all of the people all of the time."

If $F(x, t) =$ "Person x is fooled at time t," express each of these statements symbolically.