Skill Mastery Quiz 1

Communicating in Math (MTH 210-01)
Winter 2020

Name:

L1-1 Consider the following conditional statement:

If n is a prime number then n^2 has three positive factors.

Identify the hypothesis and conclusion.

The hypothesis is "n is a prime number" and the conclusion is "n^2 has three positive factors". Notice we leave off the if and the then when writing the hypothesis and conclusion.

Assume the above conditional statement is true. Assuming *only* the conditional statement and that 6 is not prime what can you conclude (if anything)? Explain your answer.

We are given that the conditional statement is true and that 6 is not prime. The fact that 6 is not prime tells us that our hypothesis is false. Given a false hypothesis, we know nothing about the conclusion. So we can not conclude anything. We can also look at this from a truth table perspective. Consider the truth table for the conditional statement $P \to Q$:

P	Q	$P \to Q$
T	T	T
T	F	F
F	T	T
F	F	T

In the third and fourth rows the hypothesis of the conditional statement is false (that is, n is not a prime number), and the conditional statement is true (that is, if n is a prime number then n^2 has 3 positive factors). Since Q (that is, n^2 has 3 positive factors), is true in the third row and false in the fourth row we can't conclude anything about the truth value of Q.

L2-1 State the definition of even integer precisely:

An integer n is even provided that...

there exists an integer q such that $n = 2q$.

Then outline a proof that if x is even and y is odd then $x + y$ is odd. (Make sure to include key details - like what things are integers.)

Suppose x is even and y is odd. Then there exist integers a, b such that $x = 2a$ and $y = 2b + 1$. Then $x + y = (2a) + (2b + 1)$ by substitution. By the distributive property $x + y = 2(a + b) + 1$. Note that $a + b$ is an integer by closure of the integers under addition. Let $q = a + b$. Then $x + y = 2q + 1$ for the integer q and so $x + y$ is an odd integer.