Skill Mastery Quiz 4

Communicating in Math (MTH 210-01)
Winter 2020

Name:

L5-3 Write a useful negation of the following statement:

For all integers n and m, if nm is even then n is even or m is even.

Useful negations don't start with "It is not true that..." and avoid the word not in cases where it could be replaced (e.g., don't use "not even").

A negation is: "there exist integers n and m such that nm is even and n is odd and m is odd."

P3-1 The following statement is incorrect:

The set of natural numbers is closed under subtraction.

Show the statement is false using a counterexample. You should clearly explain why the counterexample you found shows the statement is false.

This statement is false and there are many counterexamples. Saying the set $\mathbb{N}$ is closed under subtraction means that for any $a, b \in \mathbb{N}$ we have $a - b \in N$. For one counterexample, consider $a = 1$ and $b = 5$. Then $a - b = 1 - 5 = -4$ and -4 is not a natural number.

P1-1 Consider the following statement:

If n is even integer greater than 2 then n can be expressed as the sum of two prime numbers.

State what you would assume in a direct proof.

Assume that n is an even integer greater than 2.

State what you would assume in a proof by contradiction.

Assume that n is an even integer greater than 2 and that n can not be expressed as the sum of two prime numbers.