Skill Mastery Quiz 2

Communicating in Math (MTH 210-01)
Winter 2020

Name:

L1-2 Consider the following (true) conditional statement:

If the function f is continuous at a, then $\lim_{x \to a} f(x)$ exists.

Identify the hypothesis and conclusion of this conditional statement.

The hypothesis is "the function f is continuous at a" and the conclusion is "$\lim_{x \to a} f(x)$ exists".

Assume the above conditional statement is true. Assuming *only* the conditional statement and that a function f is not continuous at 7, what can you conclude (if anything)? Explain your answer.

Given that the function f is not continuous at 7 we know the hypothesis of the conditional statement is false. Thus we cannot conclude anything, since the statement makes no promises about what happens if a function is not continuous at a given a. See Quiz 1 solutions for an explanation with a truth table.

L2-1 State the definition of odd integer precisely:

An integer n is odd provided that...

there exists an integer q such that $n = 2q + 1$.

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

Suppose x is odd and y is even. Then there exist integers a and b such that $x = 2a+1$ and $y = 2b$. Then $xy = (2a+1)(2b) = 4ab+2b$ by substitution and algebra. By the distributive property $x+y = 2(2ab+b)$. Let $q = 2ab + b$. Note that q is an integer because a and b are integers and the integers are closed under addition. Then $x + y = 2q$ for the integer q and so $x + y$ is an even integer.

L3-1 Construct a truth table for $(\neg P \vee Q) \to R$.

P	Q	R	$\neg P$	$\neg P \vee Q$	$(\neg P \vee Q) \to R$
T	T	T	F	T	T
T	F	T	F	F	T
F	T	T	T	T	T
F	F	T	T	T	T
T	T	F	F	T	F
T	F	F	F	F	T
F	T	F	T	T	F
F	F	F	T	T	F

L4-1 Write the set $\left\{\sqrt{2}, \left(\sqrt{2}\right)^3, \left(\sqrt{2}\right)^5, \dots\right\}$ in set builder notation.

One way to do this is write $\{x \in \mathbb{R} \mid x = (\sqrt{2})^n$ for some odd natural number $n\}$. Another way is $\{x \in \mathbb{R} \mid x = (\sqrt{2})^{2n-1}$ for some $n \in \mathbb{N}\}$. There are several other ways one could correctly describe this set.