

Math 215 Fall 2018
Writing Assignment 1
Due: September 12, 2018

Make sure you are familiar with the Academic Honesty policies for this class, as detailed on the syllabus. All work is due on the given day by the time lecture starts.

This is a writing assignment. You should treat this like you would a writing assignment in an English or Philosophy or History course, except you don't have to type it. Everything you write should be part of a complete sentence and part of a larger paragraph which serves a clear purpose, your grammar and spelling should be accurate, and you should not have crossed out sections where you change your mind about what you want say. For each problem you should plan out how you want to write it in an outline or draft, and then write a polished, final product to be submitted. If you would like to learn the typesetting program \LaTeX to type your assignments, I am happy to give you a brief introduction.

Your audience should be fellow students who are excited about math but have not learned linear algebra yet. You are welcome to ask a friend who is not in the class to read your answer and let you know if it makes sense to them. There is no page or paragraph limits for this assignment but you should be (1) thorough and complete and (2) concise and exact.

1. Write a careful justification of why *if P then Q* and its contrapositive, *if not Q then not P* , are logically equivalent. You should explain why any time *if P then Q* is true, so is *if not Q then not P* , and vice versa. Do not assume your audience knows a lot of logic.

Spend some time thinking about the mathematics and maybe jotting down an outline of how you want to approach this problem first.

2. Pythagorean triples are 3 integers a, b, c such that $a^2 + b^2 = c^2$. You probably saw these numbers in a geometry course. For example 3, 4, 5, is a Pythagorean triple since $3^2 + 4^2 = 9 + 16 = 25 = 5^2$.

For this question, you will answer the question, "Are there Pythagorean triples of the form $m, m + 7, m + 8$?" To answer this question you should:

- (a) write what you believe is the correct *for all* mathematical statement or *there exists* mathematical statement to represent the answer, and then
- (b) carefully prove the statement from (a) using the proof techniques for *for all* or *there exist* statements which we have been working on in class.

If you aren't sure where to start, I suggest playing around a bit with some Pythagorean triples. Can you create some yourself?