Math 170
Final Exam
August 6, 2015

1.) State the Fundamental Theorem of Arithmetic.

2.) The final exam began at 4:30 PM today. The midterm also began at 4:30 PM. Let N be the number of hours that passed between the beginning of the midterm and the beginning of the final. Given the information above, what natural numbers can we be sure divide N?

3.) Show that a fraction is in lowest terms precisely if its numerator and denominator have no prime factors in common. (Numerator is the top of the fraction, denominator is the bottom. Keep in mind that there are two things to show here: One is that if its numerator and denominator don't have any prime factors in common, then the fraction is in lowest terms. The other is that if the fraction is in lowest terms, then its numerator and denominator don't have any prime factors in common.)

4.) Prove the Pythagorean Theorem.

5.) **A.)** List the first fifteen Fibonacci numbers.
B.) Show that the fifth and higher Fibonacci numbers can be expressed as the sum of three smaller Fibonacci numbers.
C.) Show that the seventh and higher Fibonacci numbers can be expressed as the sum of four smaller Fibonacci numbers.

6.) Recall that there are 12 people in the class. Is it possible for a note to be passed around the class in such a way that, between any two people in the class, the note changes hands exactly once? (So, once the note has been passed between two people, in either direction, it has changed hands between them, and neither of them passes the note to the other after that. How is this problem related to the Konigsberg Bridge Problem? How can a graph help to answer it?)

7.) What does it mean for two sets to have the same cardinality?

8.) Prove that any correspondence from the natural numbers to the real numbers will miss an irrational number.

9.) Write a paragraph about anything we learned about in the class that you thought was interesting. Explain it in your own words, and explain why you thought it was interesting. You can also make suggestions about how a topic in the class could have been presented in a more interesting or accessible fashion.