

Name:

Math/CCS 103

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Quiz 2: P versus NP

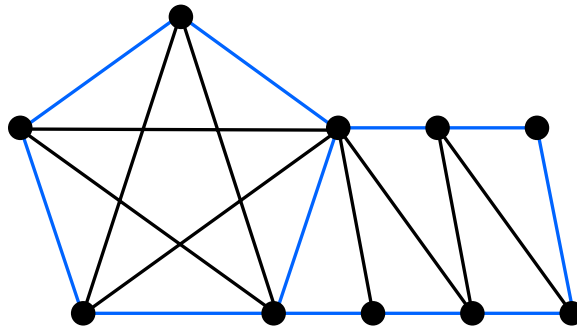
Monday, Week 3

UCSB 2014

Consider the following problem:

**Problem.** Given a graph  $G$  on  $n$ -vertices, is there a way to color each of its edges red or blue so that no monochromatic triangle is drawn on our graph?

If the answer to our solution is “yes,” then there is a natural “proof” that we would want any algorithm to output: a two-coloring of  $G$ 's edges! For example,



is an excellent “proof” that the graph in question can be two-colored in such a way that no monochromatic triangle exists.

1. Explain why this problem is in NP. In other words, give an algorithm that given any “yes” claim to an instance of our problem and a claimed proof like the one above, can determine whether or not this proof is correct in polynomial time. (Try to just find an algorithm that checks whether the claimed solution is true first, and worry about the polynomial part afterwards; almost anything you pick that checks will probably run in polynomial time.)