

Math 579 Exam 1 (part II): 1/30/7

Please read the exam instructions.

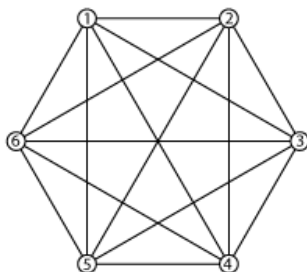
Books and notes are forbidden for this exam. Please write your answers on **separate paper** and put your name on every sheet. Cross out work you do not wish graded; incorrect work can lower your grade, even compared with no work at all. Keep this page for your records. Show all necessary work in your solution; if you are unsure, show it. This problem is worth 10-20 points. You have 30 minutes.

You may earn extra credit by submitting by the next class period (Feb. 1), revised solutions to the problems on both parts (I and II) of this exam. Your score on the revised exam will be the *lowest* three scores on part I, plus the score on part II. Hence, although you need not resubmit problems you've already solved, to improve your grade you will need to submit solutions to the problems you did not solve correctly *and* the problems you did not attempt.

PROBLEM: Suppose that exactly six students, including you, are enrolled in MATH 579. Assume that each pair of students are either friends or enemies. Prove that either:

1. There are three people in class that are mutual friends (all friends with each other); or
2. There are three people in class that are mutual enemies (all enemies with each other).

HINT: Consider various cases, depending on how many friends you have.



Alternate formulation: Prove that any red/blue coloring of the fifteen edges at left must yield either a red triangle or a blue triangle. (blue means friends, red means enemies)