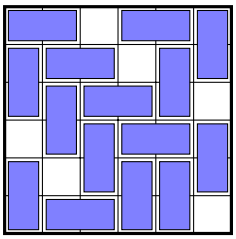
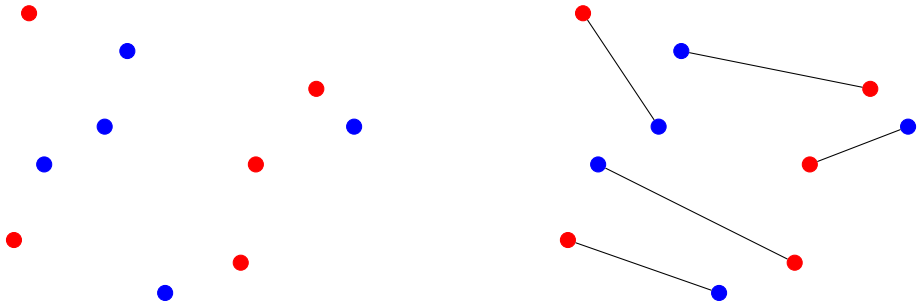
For your final draft, your score for each proof will be out of 10 points: 5 points for mathematical rigor, and 5 for clarity and grammar. You must upload your final version as a PDF through Gradescope by 1:30 PM on Friday.

Keep in mind that while you may discuss the problems with your classmates, you *must* work alone in writing up your answers. Think of it like it's an essay in an English class: you wouldn't collaborate with another student on writing a (solo) paper, because that would be cheating. So don't do that.

1. Can you tile a 6×6 board with 15 dominoes so that the six empty squares are all in different rows and columns? For example, here's an attempt that *almost* works, but there are two empty squares in the last column.



2. Suppose that n red dots and n blue dots are drawn in the plane (for some integer n) with no 3 dots in a line. Prove that it is possible to draw n *non-intersecting* line segments to connect each red dot to a different blue dot. For example, if the dots were arranged as in the picture on the left, you might pair them up as in the picture on the right.



3. Jonah is taking a math class. Each day, he either shows up to the lecture or skips it. Right now, his attendance record is less than 90%. At the end of the quarter, his attendance record will be greater than 90%. Will there necessarily be some time when his attendance record is *exactly* 90%?

4. Suppose I give you a list of 17 integers. Prove that it's possible to select five of those integers so that their sum is a multiple of 5.