**Math 201 Problem sheet 1 25 August 2015 name:\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ group:\_\_\_\_\_**

1. Carefully state the Product Principle for two finite sets.
2. Carefully state the Addition Principle for two finite sets. (Be careful here.)
3. Define: even number; odd number
4. Prove that if n is odd then so is n2.
5. Consider the expression n2 + n – 5, where n is an integer. Compute its values for n = 1, 2, 3, 4, 5.

Can you make a conjecture? Can you prove your conjecture?

1. Can you *guess* a formula for 1 + 2 + 3 + ... + n, where n is a positive integer. Explain how you arrived at this guess.
2. Consider the following problem:

**Into how many regions do n lines divide the plane?** (Here n is a non-negative integer.)

1. Why is this question ambiguous?
2. Modify this statement so that it is unambiguous.
3. What is the answer when n = 1? n = 2? n = 3?
4. What about n = 4?
5. Try n = 5.
6. What is your guess for n = 6? Can you discern a pattern?
7. Analyzing this pattern, can you find a general formula?