## **Assignment 2**

Make sure to write complete proofs. Try to avoid skipping steps. Write clear sentences.

- 1. For each of the following statements, if the statement is true then say so and provide a proof. If it is false then say so and provide an example/proof. All variables involved are supposed to be natural numbers.
  - i. For all n and m, if n + m is odd then exactly one of n,m is odd.

ii. For every n there exists an m such that n + m is odd.

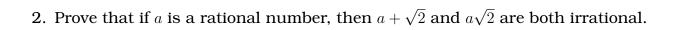
iii. There exists an m such that for every n we have that n+m is odd.

iv. For every m there exists an n so that  $n^2=m+2$ .

v. For all n, m we have that  $n \neq m$ .

vi. There exists an n so that for all m we have that  $n \neq m$ .

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3. Prove that for every number x, if  $x^2$  is irrational then x must also be irrational.

4. True or False? If b is irrational, then  $\frac{b}{b^2+1}$  is also irrational. Prove or disprove.