Proof Portfolio Problem 5

Chose one problem from each numbered group. For example, choose only one of 5A, 5B, and 5C.

The goal here is for you to become competent in proof writing and confident in your ability in your future courses. No collaboration and no outside resources. Please see me when you need support.

Remember to see the directions for what to do with conjectures that are false.

Conjecture 5A.[1] The real number $\log_3 8$ is irrational.

Conjecture 5B.[2] The real number $\sqrt{18} - \sqrt{2}$ is irrational.

Conjecture 5C. [3] For all integers p, if p is a prime number then $\sqrt{p}$ is irrational.

[1] Recall that $\log_3 8$ is a real number a such that $3^a = 8$.

[2] You can assume $\sqrt{2}$ is irrational (we proved this in class). However, you can not assume $\sqrt{18}$ is irrational. In any case, the irrational numbers are not closed under subtraction.

[3] You may assume the following: for any prime p if $p \mid a \cdot b$ then $p \mid a$ or $p \mid b$.