A few guidelines for writing up proofs

- Either use a pencil/eraser or use white-out: no scratch-outs, please! You may find it helpful to first write out a draft of the proof (using abbreviations, symbols, whatever) and then to rewrite it nicely.

- The proof should begin with a statement of what you are trying to show.

- Everything, including equations, should be part of a complete sentence.

- Whenever possible, use words, not variables, to begin your sentences.

- The symbols "⇒", "→", and the like should not appear in your proofs (at least for now).

- The proof should end with a restatement of what you have shown.

As an example, suppose you are asked to prove that \( \sqrt{2} \) is irrational. The proof below demonstrates the sort of style that I am looking for. (You are also encouraged to note how Fraleigh writes up solutions to the examples and theorems he presents.)

**Proof.** We want to show that \( \sqrt{2} \) is irrational. Assume, towards a contradiction, that \( \sqrt{2} \) is rational. Then we can write \( \sqrt{2} = \frac{p}{q} \), where \( p \) and \( q \) are integers, \( q \neq 0 \), and \( \frac{p}{q} \) is in reduced form—that is, \( p \) and \( q \) have no common factors. Squaring this equation yields \( p^2 = 2q^2 \), so \( p^2 \) is even. Since an odd number squared is odd, \( p \) must be even, and we can therefore write \( p = 2m \) for some integer \( m \). Substituting \( 2m \) for \( p \) in our equation gives us \( 4m^2 = 2q^2 \), which simplifies to \( 2m^2 = q^2 \). As before, this implies that \( q \) is even. But that means that \( \frac{p}{q} \) is not in reduced form, which contradicts the assumption that we had written \( \frac{p}{q} \) in reduced form. Therefore, \( \sqrt{2} \) is irrational. \( \Diamond \)