Observations and General Comments Regarding Assignment 1

Not all of these remarks apply to everyone, but most apply to many people, based upon my having completed grading the first assignment.

The most critical and pervasive problem is the failure to write a proof of a statement of the form,

"Show that, for all objects X, X has property P." Examples of this type of statement are:

1. Show that for any set S, S++ = S+.
2. Show that, for any n, the number of palindromes over Σ = {a,b} of length 2n equals the number of palindromes of length 2n-1.
3. Show that for any y, y^3 ϵ PALINDROME then y ϵ PALINDROME.

Each of these states that, for any object of the given type (set, integer, string), something is true of that object.

The common mistake is to write something like:
Let S = {aa, bb}, or let n = 2. or let y = "aaa" after which the "proof" shows that that particular object has the stated property. This only shows that for one particular thing, the property is true. A correct proof has to begin with, "let S be an arbitrary set over {a,b}", or "let n be any number", or "let y be any string."

The second most critical and pervasive problem is a general lack of precision. Imprecise language is not part of proofs. Usually imprecise language is indicative of imprecise thinking. A proof is a sequence of statements s1, s2, s3, ..., sn, such that each sk is either an initial premise or is derived by logical consequence from preceding statements. If a statement uses a word or phrase that has no precise meaning, then it is not a consequence of anything, and any statements derived from it cannot be considered to have been proved from the premises.

Examples of this type of language are:

"even combinations of a's and b's".

> What does this mean? Is it that the number of a's and b's is an even number? Does it mean that the number of a's and number of b's are each even, or might it even mean that the number of a's and b's are equal?

" Let y = aXb where X is an alphabet."

> What is it supposed to mean that the symbol for an alphabet is used as a placeholder in a string?

"The language cannot have an odd number of a's."

> How can a language, in this case infinite, have an odd number of anything? Does this mean that every word in the language has an odd number of a's? Probably, but that is not what it states.

Other problems that I found in many of the papers that I read included:

1. Failure to use terminology correctly, or using the same word to mean many different things. For example, the word "alphabet" was used to mean a set of symbols, a substring, an individual letter in a string, and a language.
2. Confusing the difference between "x is a substring of any word in S" with "x is a word in S".