

An Ode to Problem 6 Part 2

For any language L that surely isn't context-free,
And any language F that's as finite as can be,
If we take F away from L in that "set minus" way,
What's left is still not context-free: a fact I shall display.

First we consider all the things that in F can't be found,
Some of which are still in L -- an insight that's profound.
So when we take the intersection of F complement and L ,
The result's the same as when we did "set minus," I can tell.

Then let's suppose that we were wrong before and make a change:
We'll say L minus F is context-free and make an exchange.
By adding F back into L we're surely bound to find,
That L itself is context-free -- a falsehood, I remind.

We cannot simply union F back to its good friend L ,
For within the finite set some extra members surely dwell.
And those we did not firstly take we cannot then return.
We'll put back only those we took and leave the rest to burn.

Since F is finite, fixed, and small, we're at a sure advantage.
No matter what we take from F what's left we still can manage.
For any set is finite when its parent's finite too,
So the set that's shared by F and L is finite through and through.

By taking F and L together -- what you the intersection call,
And then applying Union to F -slash- L and all,
We obtain another language in the context-free arena
By a proving method we will call "Proof by Christina"

L 's not context-free, we said, but then we said it was:
A contradiction of the sort I'm sure must give us pause.
The logic's pure and yet I'm sure the outcome's looking grim.
So our assumption must be flawed; its accuracy dim.

Thus we have shown more clearly than can ever be denied,
That lots of complex mathematics can in verse be simplified.
If a language wasn't context-free before it isn't bound to be
When some small set of strings are taken out and then set free.

This proof which took an hour on the board in detail mired
Took just a moment after Chris's blog this verse inspired.
Besides a proof for 2 4 3 (which surely shall be graded),
It's also proof that the author's sanity has faded.