The 2-Across Cutting Stock Pattern Minimisation Problem

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My project focused on the rewriting and formalisation of a paper of Natashia Boland's focusing on this problem. Not only did I learn a lot about the problem at hand, but also a lot about writing good mathematics.

The 2-across cutting stock problem is an integer programming problem which is used as a heuristic for finding good approximate solutions to more general cutting stock problems, since it retains the complexity of general cutting stock problems, yet is the simplest of the non-trivial cases. In general, cutting stock problems have two main objectives: the aforementioned pattern minimisation, and waste minimisation. Also, in the 2-across case, there are only 2 main cases to consider: even total demand, or odd total demand

The main focus of the part of the paper I was working on was showing that, in the 2-across case, it was enough to focus on the pattern minimisation of the even case, and formalising the proofs of the results that led up to this conclusion.

As well as refining my knowledge of both English and mathematical grammar, it allowed me to flex a little of my mathematical creativity. To inject a little intuition into some of the proofs, Natashia and I formulated some new notation to talk about feasible solutions to the problem, reducing some of the abstract manipulations taking place in the proofs to simple algebra.

In all, I believe that not only did I have a chance to learn new mathematics, and maybe add to some old, but refine some of the skills I've built during my degree, earlier than others get a chance to. This experience will benefit me well into my academic career.