EDITORIAL

Have you ever heard of the airplane refuelling problem? I've just recently stumbled upon it in a research paper. Just like many problems that grew into a research topic, this problem started off as a puzzle originally appearing in *Puzzle Math* by George Gamow and Marvin Stern. The simplest version of the problem is as follows: suppose you have to fly a plane non-stop around the world, the distance that is greater than the range of any plane you have available. In fact, you can only go half way around the world on a full tank, so you will have to arrange other planes to assist you with refuelling mid-air. Suppose you start with several identical planes that can all refuel each other, how many planes do you need and what is your refuelling plan? Remember: all the planes have to be able to return home!

It is easy to make this problem more complicated, which is of course exactly what mathematicians did. What if the full tank only takes you $1/n^{th}$ of the way? What if the planes are not identical? How about if you want to account for refuelling time and decreasing fuel consumption? This most general airplane refuelling problem with arbitrary tank volumes and consumption rates now fits into the class of problems known as scheduling problems and is still open although some yet unpublished results claim differently.

This is the beauty of problem solving: it starts off as a game, a puzzle, where the participant is guided only by his or her own curiosity, and ends ... well, it need not end. This is what ***Crux*** is for. I'll leave you with this quote by John von Neumann, whose birthday it happens to be today as I'm writing this (he would have been 112 years old):

> A large part of mathematics which becomes useful developed with absolutely no desire to be useful, and in a situation where nobody could possibly know in what area it would become useful; and there were no general indications that it ever would be so. By and large it is uniformly true in mathematics that there is a time lapse between a mathematical discovery and the moment when it is useful; and that this lapse of time can be anything from 30 to 100 years, in some cases even more; and that the whole system seems to function without any direction, without any reference to usefulness, and without any desire to do things which are useful. (In "The Role of Mathematics in the Sciences and in Society", an address to Princeton alumni in 1954.)

Kseniya Garaschuk