Week 32

Let us start with the number 88209. You can split it into two parts: 88 and 209, and then add them together so as to get $88 + 209 = 297$. Now, if you square the result then you will get back to the beginning number 88209, namely:

$$88209 \ \rightarrow \ 88 + 209 = 297 \ \rightarrow \ 297^2 = 88209$$

This number is not unique. For example, you can easily verify the following:

$$494209 \ \rightarrow \ 494 + 209 = 703 \ \rightarrow \ 703^2 = 494209$$

Actually, there are more. But the most interesting one might be 1234567900987654321 (almost but not perfectly symmetrical!), which yields

$$123456790 + 0987654321 = 1111111111$$

$$\rightarrow$$

$$1111111111^2 = 1234567900987654321$$

Yet, the largest of such amazing numbers known to us today is the following 100-digit number:

66942 14876 03305 78512 39669 42148 76033 05785 12396 69420
14876 03305 78512 39669 42148 76033 05785 12396 69421 48761

This large number, after the above "split and add" operations, is equal to $\underbrace{8181\cdots8181}_{25 \text{ pieces of } 81}{}^2$

Furthermore, you can find numbers that can be split into 3 parts:

$$1212 + 1388 + 2349 = 4949^3 = 121213882349$$

Or, into 4 parts:

$$20 + 15 + 11 + 21 = 67 \ \rightarrow \ 67^4 = 20151121$$

If you are smart enough, or very good in computer programming, you may be able to move forward this way to find other similar amazing numbers … Have fun!

GRC ☺