Tutorial -- Exploring Number Patterns with Scientific Notebook

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Abstract

In mathematical experiments we explore special cases of theorems which illuminate the generalities. The momentum of discovery can be enhanced greatly with Scientific Notebook. This is due in part to the two dimensional construction of expressions mimicking our familiar mathematical habit. In this tutorial we are to guide the participants through the exploration by creating and evaluating such expressions.

For the preparation of the tutorial, participants are invited to focus on this table of numbers:

1							
1	-1	0	0	0	0	0	0
1	-2	2	0	0	0	0	0
1	-3	6	-6	0	0	0	0
1	-4	12	-24	24	0	0	0
1	-5	20	-60	120	-120	0	0
1	-6	30	-120	360	-720	720	0
1	-7	42	-210	840	-2520	5040	-5040

Can you find a simple rule generating the rest of the table?
Can you think of some formulae where the above number pattern occurs naturally?