Arithmetic of affine del Pezzo surfaces

Lyczak, J.T.

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Author: Lyczak, J.T.
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Propositions

appended to the thesis

Arithmetic of affine del Pezzo surfaces

by

J. T. Lyczak

1. The algebraic Brauer group modulo constants of an ample log K3 surface of geometrically irreducible type of degree at most 7 is one of 27 possible finite groups.
   joint with dr. Bright

2. Let $U = X \backslash C$ be an ample log K3 surface of geometrically irreducible type of degree at most 7 over a number field k. The order of $\operatorname{Br} U / \operatorname{Br} k$ is bounded by a constant which only depends on the degree of k.
   joint with dr. Bright

3. There exist ample log K3 surfaces over $\mathbb{Q}$ which admit a model with an order 5 Brauer–Manin obstruction to the integral Hasse principle.

4. Let k be an algebraically closed field and Z a curvilinear scheme of degree r on a smooth surface S over k.

   The blowup $B \to S$ of S in Z decomposes as $B \xleftarrow{\gamma} X \xrightarrow{\pi} S$ where π is the composition of r blowups in closed k-points, and γ is the morphism which contracts all integral curves on X of self-intersection -2 which are contracted by π.

5. Let k be a positive integer. We consider all possible football matches in which $2k$ goals are scored in total. The number of such matches in which the end result is a draw equals the number of such matches in which the home team is never behind. (By a "football match" we mean the set of all intermediate pairs of scores that occur during the match.)
   (MOAWOA 2016)
   joint with dr. Van Bommel

6. The sequence
   $$1, \ 14, \ 144, \ 1444, \ 14444, \ \dots$$
   contains precisely three squares.
   (LIMO 2017)

7. Fix a prime p. Let x_i for $1 \le i \le r$ be the distinct elements of a subset X of $\mathbb{F}_p^\times$ such that
   $$\{x_i + x_j \mid 1 \le i < j \le r\}$$
   equals $\mathbb{F}_p^\times$ as a multiset.
   The set X is a coset of squares modulo 11.
   (MOAWOA 2019)

8. A prime in music is the unit and always perfect, whereas in mathematics it is neither a unit nor perfect.

9. Trust in cognates, even proper ones, when speaking a foreign language can be misplaced as indicated by the words 'globaal' and 'global', and 'overal' and 'overall' in respectively Dutch and English.

Propositions 5, 6 and 7 are respectively a problem, the main idea behind a problem and a reformulation of a problem which were selected for the indicated mathematical contests.