Polynomials, permutations, and the Paris metro
Nate Harman
9 October 2021

Suppose I have several polynomials \( p_1(x), p_2(x), \ldots, p_n(x) \), which for small negative values of \( x < 0 \) satisfy
\[
p_1(x) > p_2(x) > \cdots > p_n(x),
\]
so their graphs are neatly stacked in order. Then at \( x = 0 \) catastrophe happens: all of the polynomials satisfy
\[
p_i(0) = 0
\]
and their graphs all collide at the origin in spectacular fashion. A moment later, for small \( x > 0 \), the graphs split apart once again but in some new order
\[
p_a_1(x) > p_a_2(x) > \cdots > p_a_n(x).
\]

What can we say about this new ordering? What does this have to do with the Paris Metro?

Combinatorics of Curves on the Torus
Max Lahn
• 10 March 2022

How many simple curves can be drawn on a torus so that any pair of them intersect some specified number of times? We will introduce these kinds of combinatorial questions and reframe them graph-theoretically. We’ll explore some known cases in an interactive activity, and then point to what is known and what is conjectured for surfaces with more holes. No prior knowledge of surface topology or graph theory is required, but curiosity and an appreciation of balloons are recommended and encouraged.

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Michigan Math Club
Thursday at 4pm in EH1360
Free pizza and pop afterwards!

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