Digital Plane and the Digital Jordan Curve Theorem

Maria Skupień

I will show how to define reasonably paths, arcs, Jordan curves, and connectedness on the digital plane $\mathbb{Z}^2$. I will discuss somewhat surprising problems that occur when trying to formulate a digital analogue of the Jordan Curve Theorem. I will also outline a proof of Rosenfeld's Digital Jordan Curve Theorem, based on properties of line complexes associated to digital sets. Finally, I will present a few general remarks on topologization of the digital plane.

Erdös Discrepancy Problem

Damian Komonicki

Discrepancy theory is a branch of mathematics which deals with hypergraph colouring problems. Given a hypergraph $\mathcal{H} = (U, S)$, one can wonder if there exists a colouring $c : U \longrightarrow \{-1, +1\}$ such that the colours are distributed uniformly, or if a discrepancy always occurs.

The main purpose of the poster is to discuss a problem in discrepancy theory posed by Paul Erdös in 1930s as a logical puzzle. We will present a proof of the Erdös conjecture in the case of discrepancy index 2 and compare it to the solution of the puzzle. Next, we will discuss a result for the case of discrepancy

index 3, recently obtained by two computer scientists from the University of Liverpool.

Minimum Spanning Trees

Katarzyna Czeczotka, Adrianna Matuszczak

Our poster will treat about minimum spanning trees (MST). It will illustrate its definition and key properties with graphical examples as well as selected algorithms used to find such a tree i.e. Prim algorithm and Kruskall algorithm. The application of MST will also be presented.

On the Achromatic Indices of Graph Products

Arsine Mangasaryan, Petros Petrosyan

A proper edge-coloring of a graph G with colors $1, \ldots, t$ is called a complete edge t-coloring if for every pair of colors i and j, there are two edges with a common vertex, one colored by i and the other colored by j. The largest value of t for which G has a complete edge t-coloring is called the achromatic index $\psi'(G)$ of G. In this work achromatic indices of various graph products are investigated.

Some applications of the Chinese Remainder Theorem in the topological dynamics of $\mathscr{B}$-free systems

Aurelia Bartnicka

On the poster will be definitions of $\mathscr{B}$-free numbers denoted by $\mathcal{F}_{\mathscr{B}}$, (coprime and thin) $\mathscr{B}$-free system, proximality, $\eta \in \{0, 1\}^{\mathbb{Z}}$ – the sequence corresponding to the characteristic function of $\mathcal{F}_{\mathscr{B}}$, (S, X_η) subshift generated by η, admissible sequence. There will be formulated and proved theorems: the first one about the minimal subsets of the proximal subshift of admissible sequences i. e.

If $(S, X_{\mathscr{B}})$ is proximal then $\{(\ldots, 0, 0, 0, \ldots)\}$ is the only minimal subset and the equivalence of proximality of (S, X_η) to one from six conditions. On the last part of the poster will be generality of the Chinese Remainder Theorem in the case not relatively prime modules.

Some Method of Proving Formulas with Binomial Coefficients

DANIEL STRZELECKI

My poster will show generating functions used to prove formulas with binomial coefficients. All of us know expansion of $\frac{1}{1-x}$. We can simply write exapnsions of $\frac{1}{(1-x)^k}$ for positive integer k. Using these two formulas I will show how to prove advanced formulas, for example: $\sum_{i=0}^{n} \binom{2n+1}{2i}\binom{2i}{i} 2^{2n-2i+1} = \binom{4n+2}{2n+1}$

The Fox and the Hare: Stability of a Food Web

MARTYNA PATERA

Food web is a community of organisms where there are several interrelated food chains. It is a complex network consisting of many species forming predator-prey relationships. An important property of a food web is stability, which is maintenance of the same structure in spite of change of its components. Stability is important for the biological balance. If the network is not stable, interference in some part of it affects all of its components.

We will use graph theory to investigate the stability of a forest food web. We will define a food web of a directed graph and investigate status of species in it. For this purpose the axiomatic description of measures of trophic status will be introduced. At the end we will examine what conditions must be met for a food web to be stable.

The Grim Game and the Sprague - Grundy Theorem

Martha Łącka, Mateusz Łącki

The Grim Game is a graph game created by J. Peabody and K. Willis. In the poster we will show how to apply the Sprague-Grundy theorem to indicate which player has the winning strategy in case of linear chains of size $1 - 1.4 * 10^8$.

Theory of games of two members - examples

Marzena Kwiatkowska, Anita Mazur

First we will present the definition of theory of games. Next we will explain that with examples of games of two members. First example will concern game of two members with zero sum and the second one will concern game of two members with non-zero sum.