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Her main research focuses on chromatic graph theory, especially on chromatic polynomials of graphs and hypergraphs. She is also interested in actuarial mathematics, particularly in applications of mathematics in non-life insurance. Her scientific results were presented during numerous international conferences and published in many scientific journals. She currently serves as Vice Dean for Student Affairs at the Faculty of Fundamentals of Technology, Lublin University of Technology.

Selected issues on the chromaticity of graphs and their applications

Over hundred years ago George Birkhoff studied the Four Color Problem, which dates back to 1852. He tried to prove that each map on the plane can be colored with at most four colors in such a way that no two regions with a common border have the same color. This problem can be transformed into the problem of coloring a graph. The vertices of the graph correspond to the regions and two vertices are connected by an edge if and only if the corresponding regions have a common border.

Birkhoff noticed that the number of ways a certain map can be colored with at most λ colors can be expressed as a polynomial of variable λ . This polynomial is called the chromatic polynomial. In 1932, Hassler Whitney expanded the definition of chromatic polynomial for arbitrary graphs. Selected properties of such polynomials for different types of graphs, the interpretations of their coefficients, some methods of determining such polynomials and the problem of chromatically unique graphs will be presented.

The issue of chromatic polynomials of hypergraphs and some applications of the theory to practical problems will also be mentioned.

