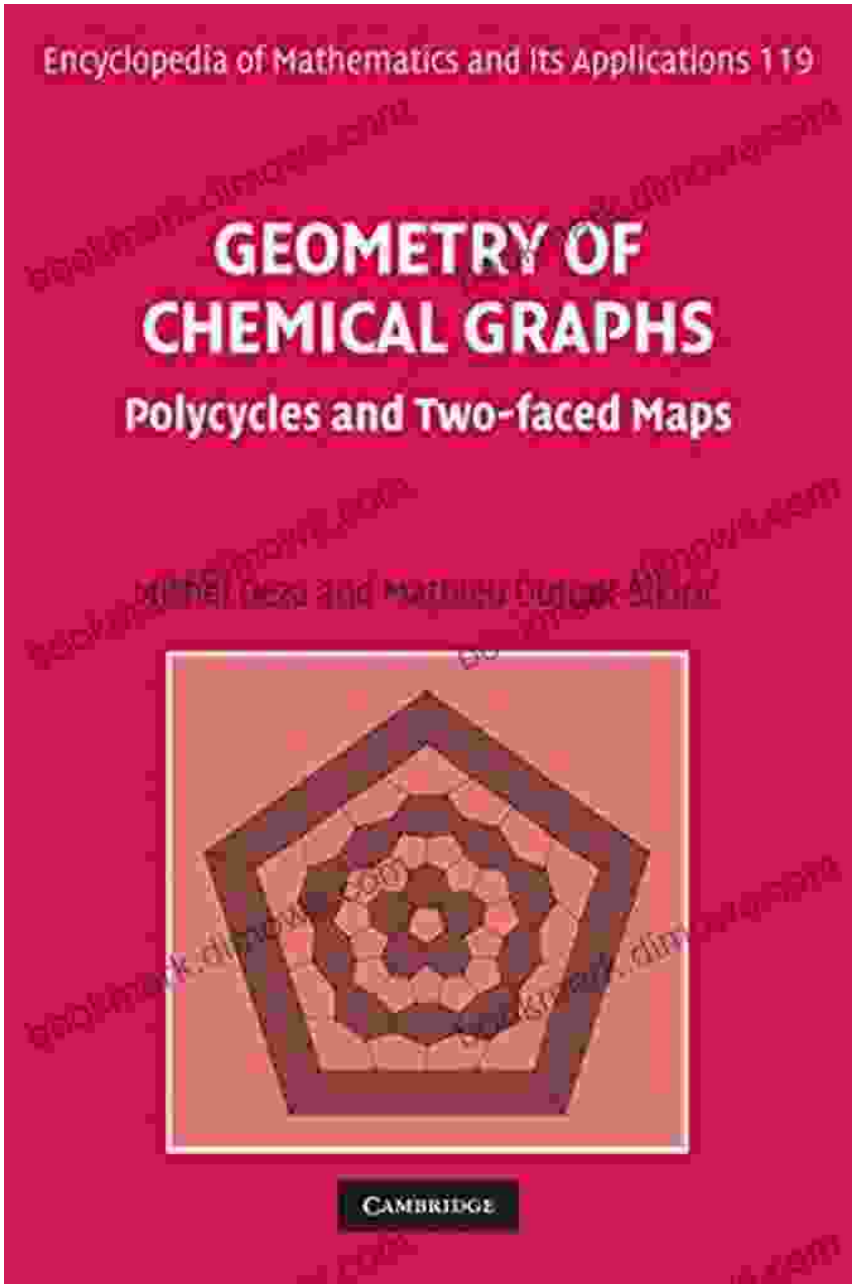
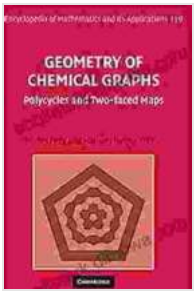
Discover the Enigmatic World of Polycycles and Two-Faced Maps: Your Encyclopedia to the Frontiers of Mathematics



Step into the fascinating realm of polycycles and two-faced maps, where mathematical intricacies unravel into a tapestry of hidden symmetries and

topological wonders. This comprehensive encyclopedia embarks on an enlightening journey through the labyrinthine world of graph theory, uncovering the profound connections between polycycles, maps, and other mathematical disciplines.



Geometry of Chemical Graphs: Polycycles and Two-faced Maps (Encyclopedia of Mathematics and its Applications Book 119) by Hans Wilhelmsson

4 out of 5

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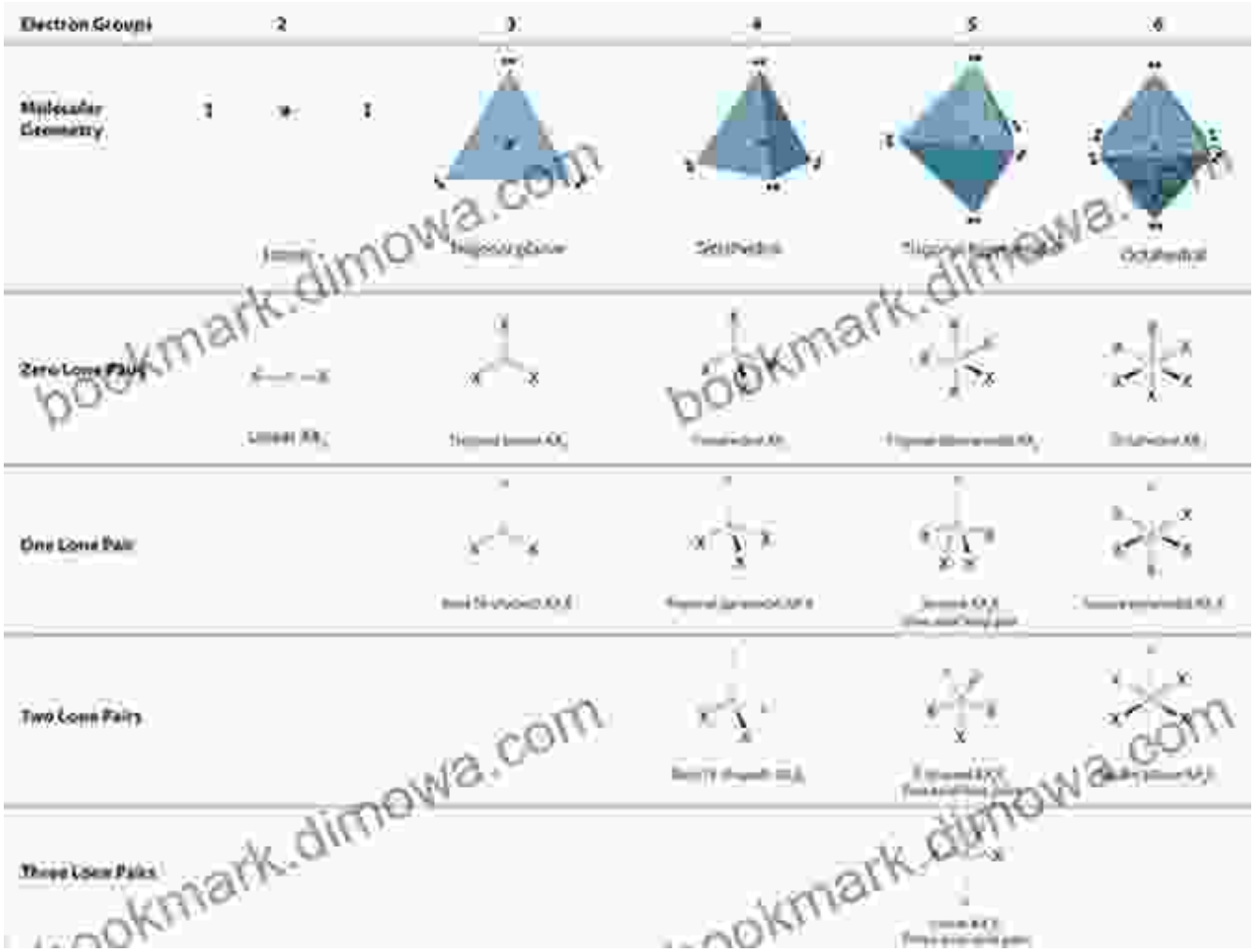
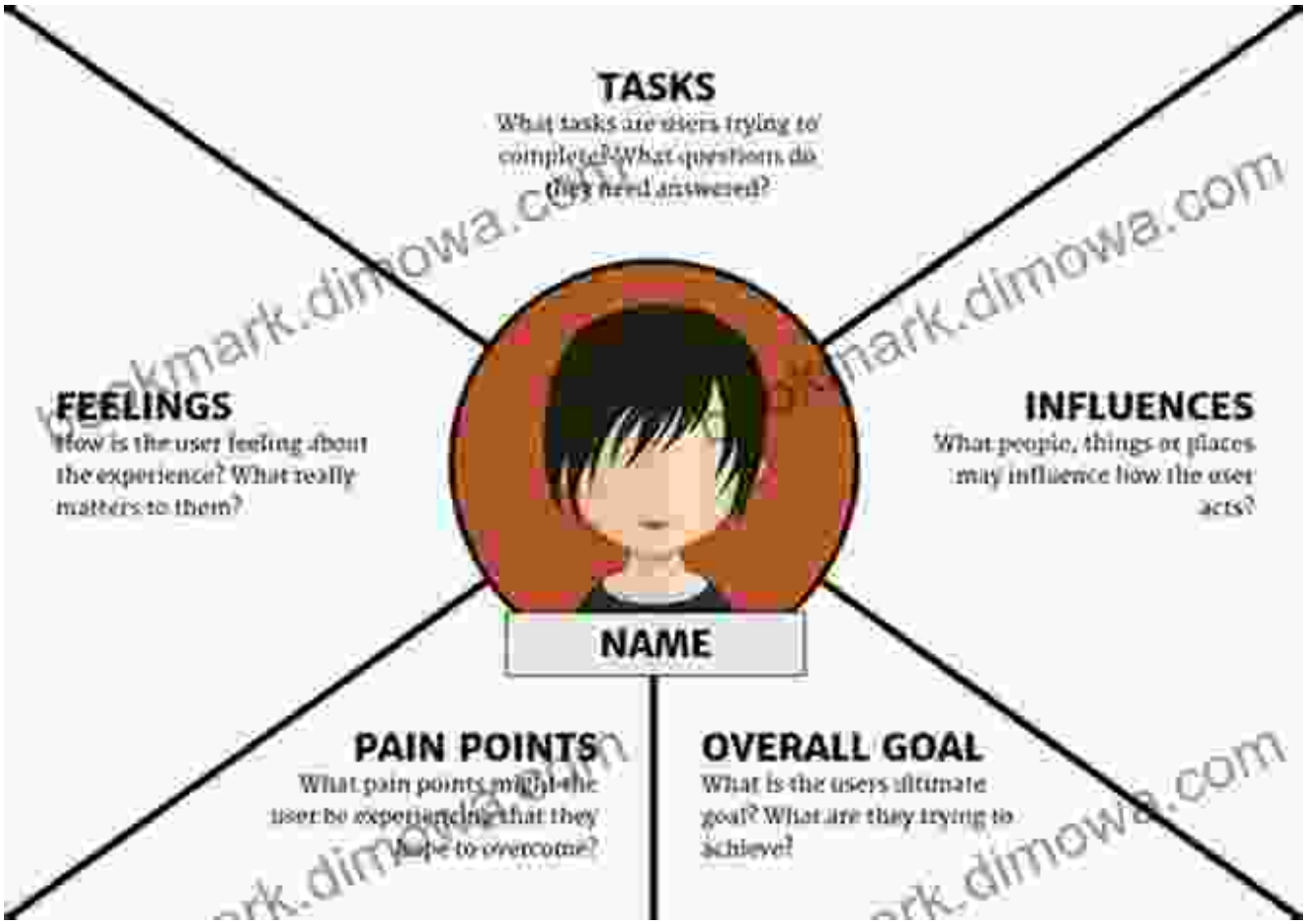
Chapter 1: Polycycles: The Building Blocks of Graph Theory

Polycycles form the cornerstone of graph theory, their polygonal faces and intricate arrangements serving as fundamental elements in many mathematical applications. This chapter delves into their basic properties, classifications, and the tantalizing pursuit of characterizing all possible polycycles.



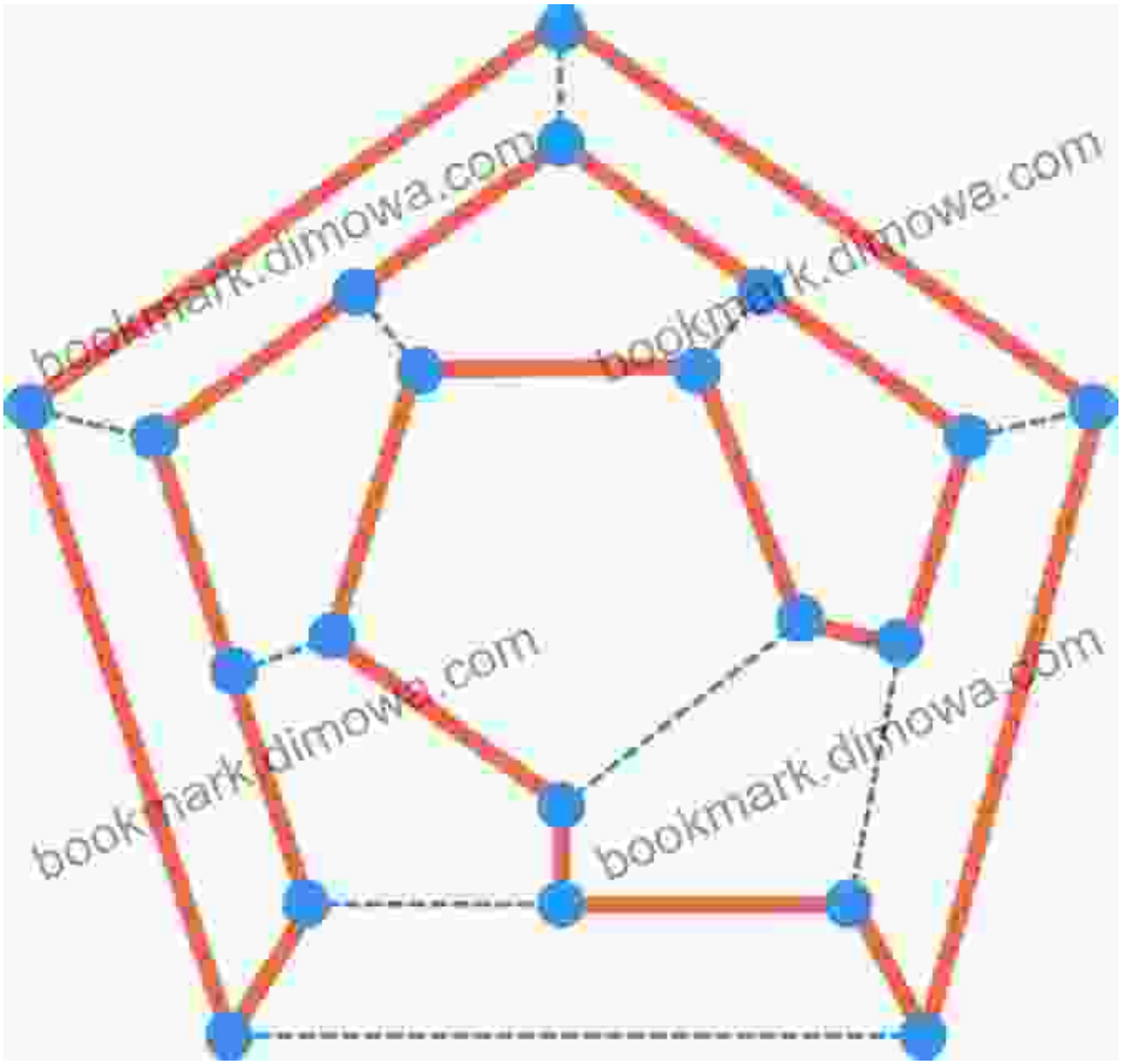
Chapter 2: Two-Faced Maps: Bridging Topology and Graph Theory

Two-faced maps emerge at the intersection of topology and graph theory, embodying a duality that challenges our intuition. Explore the fascinating properties of these maps, their paradoxical nature, and their profound implications for graph theory and other areas of mathematics.



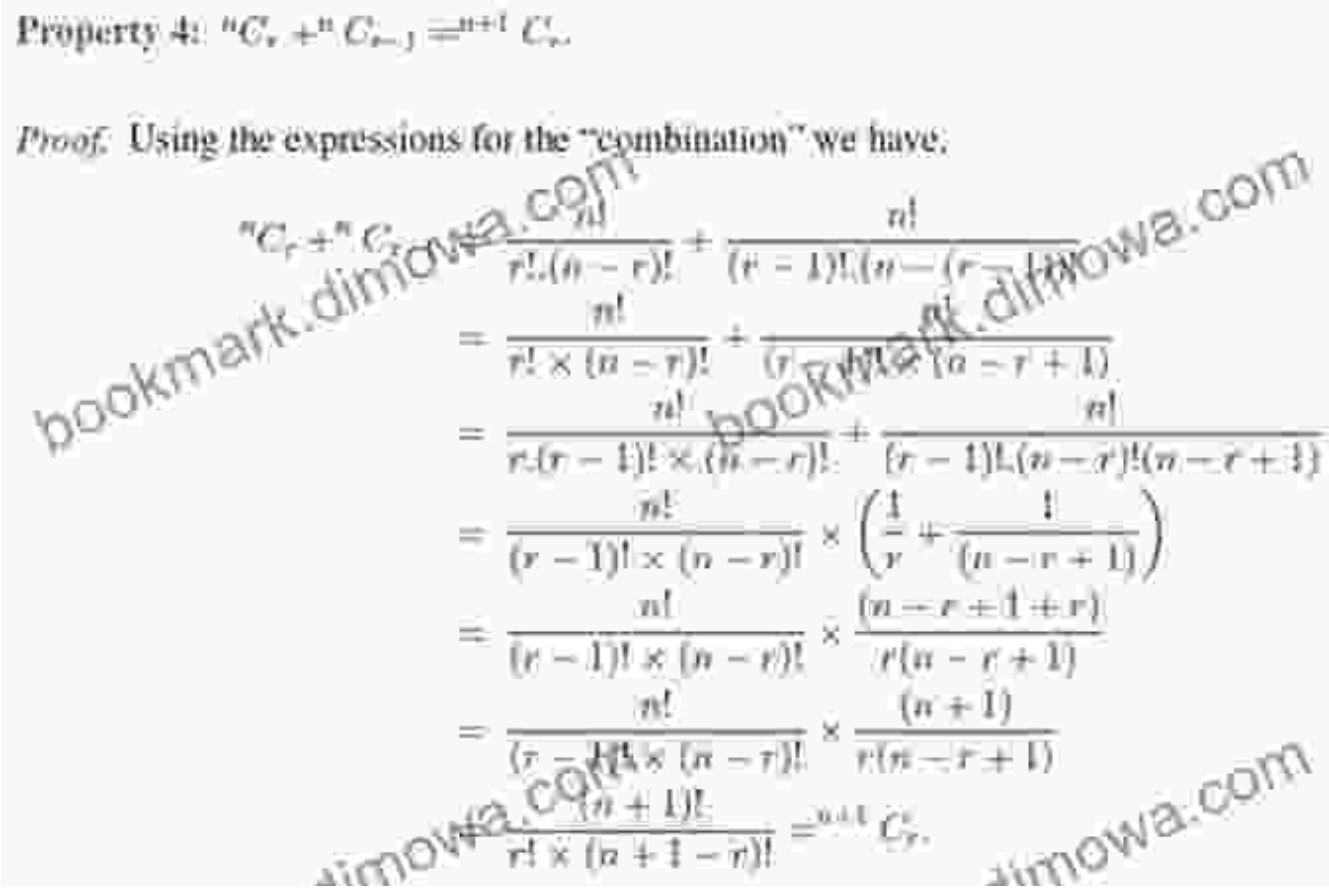
Chapter 3: Cycles, Paths, and Hamiltonian Properties

Cycles and paths are fundamental concepts in graph theory, and this chapter investigates their intricate relationship with polycycles and two-faced maps. Uncover the Hamiltonian properties that govern these graphs, leading to tantalizing puzzles and profound mathematical discoveries.



Chapter 4: Combinatorial Properties and Algorithmic Techniques

Delve into the combinatorial properties of polycycles and two-faced maps, exploring their counting problems, enumeration techniques, and the algorithmic challenges they pose. Discover the cutting-edge techniques used to tackle these intricate combinatorial puzzles.



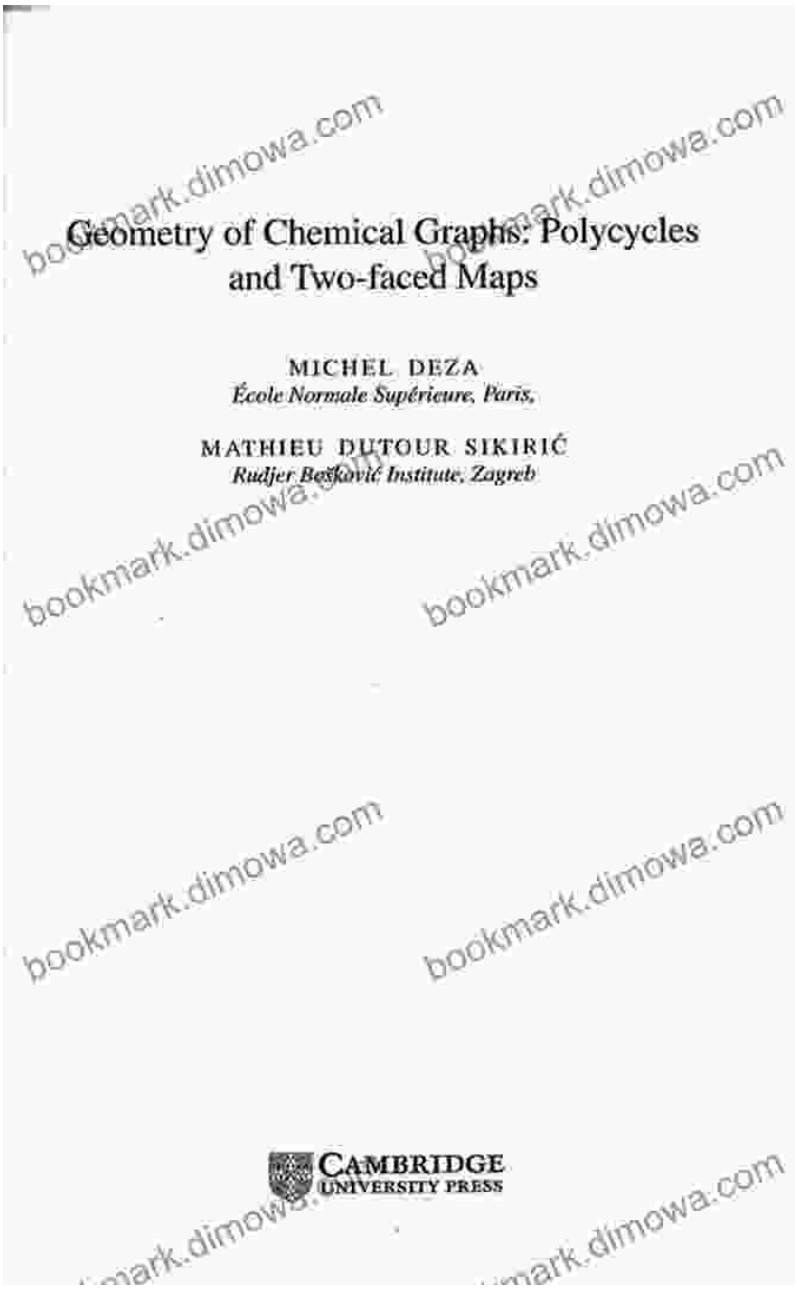
Property 4: ${}^{n}C_{r} + {}^{n}C_{r-1} = {}^{n+1}C_{r}$.

Proof. Using the expressions for the "combination" we have:

$$
\begin{aligned}
{}^{n}C_{r} + {}^{n}C_{r-1} &= \frac{n!}{r!(n-r)!} + \frac{n!}{(r-1)!(n-(r-1))!} \\
&= \frac{n!}{r! \times (n-r)!} + \frac{n!}{(r-1)! \times (n-r+1)} \\
&= \frac{n!}{r(r-1)! \times (n-r)!} + \frac{n!}{(r-1)!(n-r)!(n-r+1)} \\
&= \frac{n!}{(r-1)! \times (n-r)!} \times \left(\frac{1}{r} + \frac{1}{(n-r+1)} \right) \\
&= \frac{n!}{(r-1)! \times (n-r)!} \times \frac{(n-r+1+r)}{r(n-r+1)} \\
&= \frac{n!}{(r-1)! \times (n-r)!} \times \frac{(n+1)}{r(n-r+1)} \\
&= \frac{(n+1)!}{r! \times (n+1-r)!} = {}^{n+1}C_{r}.
\end{aligned}
$$

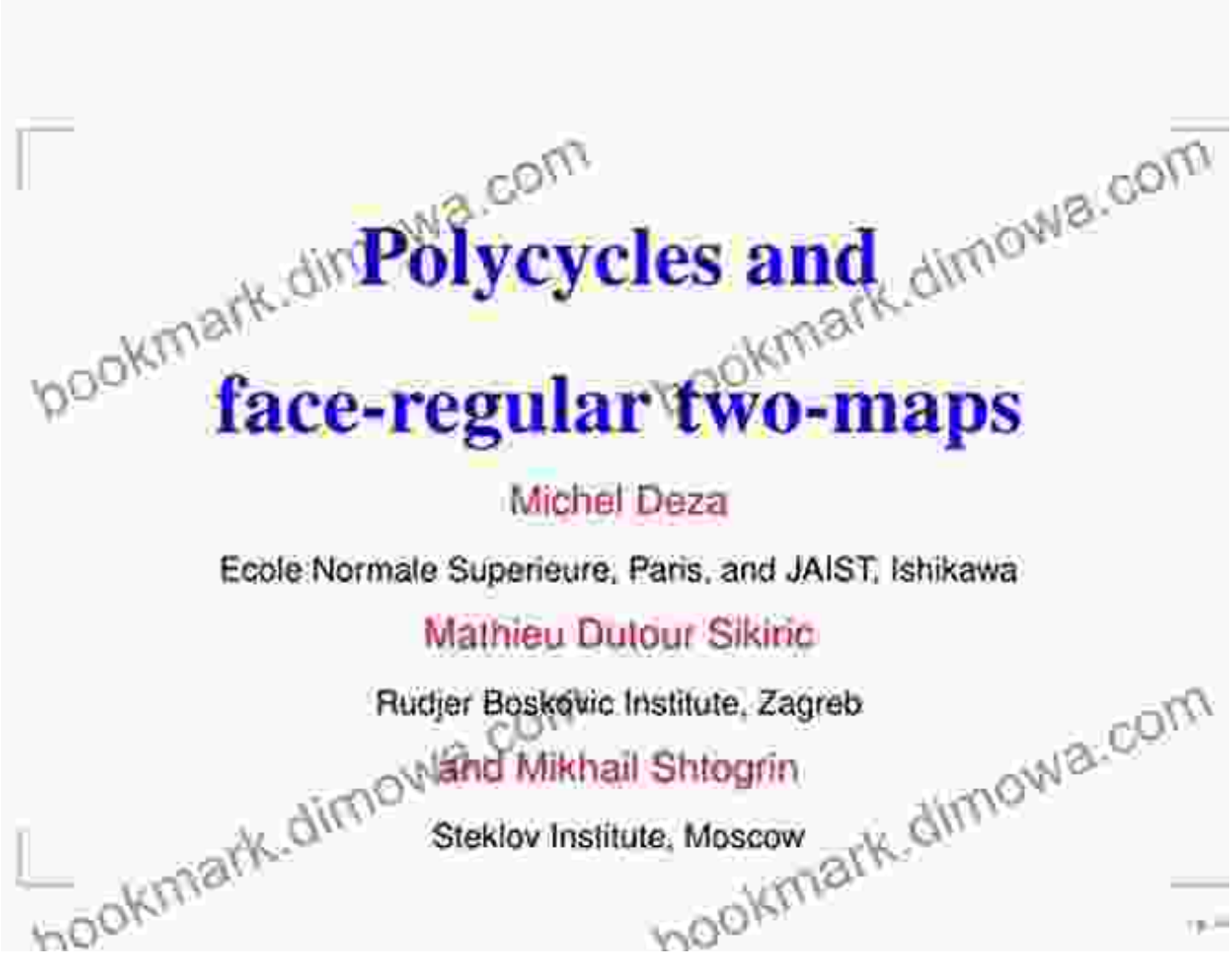
Chapter 5: Applications in Science and Technology

The mathematical insights gained from studying polycycles and two-faced maps extend into a myriad of practical applications, including chemistry, physics, and computer science. This chapter showcases the transformative power of these concepts in diverse scientific and technological domains.



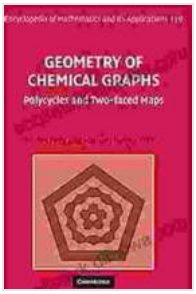
Chapter 6: Open Problems and Future Directions

The exploration of polycycles and two-faced maps is far from complete, and this chapter delves into the tantalizing array of open problems that beckon researchers to delve deeper. Discover the frontiers of mathematical research and the exciting possibilities that lie ahead.



This comprehensive encyclopedia is the ultimate resource for mathematicians, graph theorists, and anyone fascinated by the enigmatic realm of polycycles and two-faced maps. Its meticulously crafted chapters, written by leading experts, offer a profound and accessible exploration of this captivating mathematical landscape.

Delve into the intricacies of polycycles, unravel the paradoxes of two-faced maps, and embark on a journey into the uncharted territories of graph theory. This encyclopedia will ignite your curiosity, challenge your intellect, and open up new avenues of mathematical discovery.



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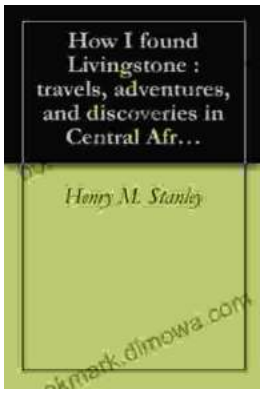

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