


PLANARITY TESTING

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AGENDA

Introduction

Simple Math

Our Solution

Live Demonstration

Conclusion

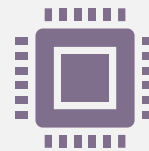
INTRODUCTION



What is a planar graph?



How does a computer read planar graphs?



What can planar graphs be used for in the real world?

DUAL GRAPHS & THE FOUR COLOUR THEOREM

Given any separation of a plane into contiguous regions (like a political map of the world), no more than **4 colors** are required to color the regions so that no two adjacent regions share the same color.

By converting the map to a Dual Graph, mathematicians could apply graph theory rules (like Euler's formula) to solve the map-coloring problem.

IMPLEMENTATION OF 3D SPHERES

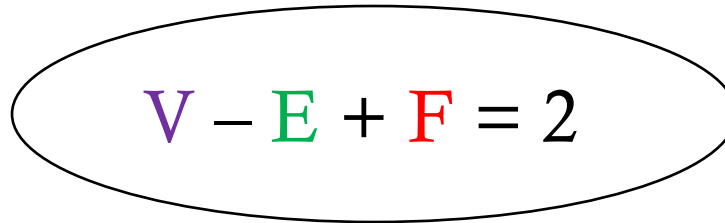
In computer science, treating a planar graph as if it lives on a sphere (rather than a flat plane) solves several messy coding problems.

Used in multiple areas such as procedural generation

SIMPLE MATH

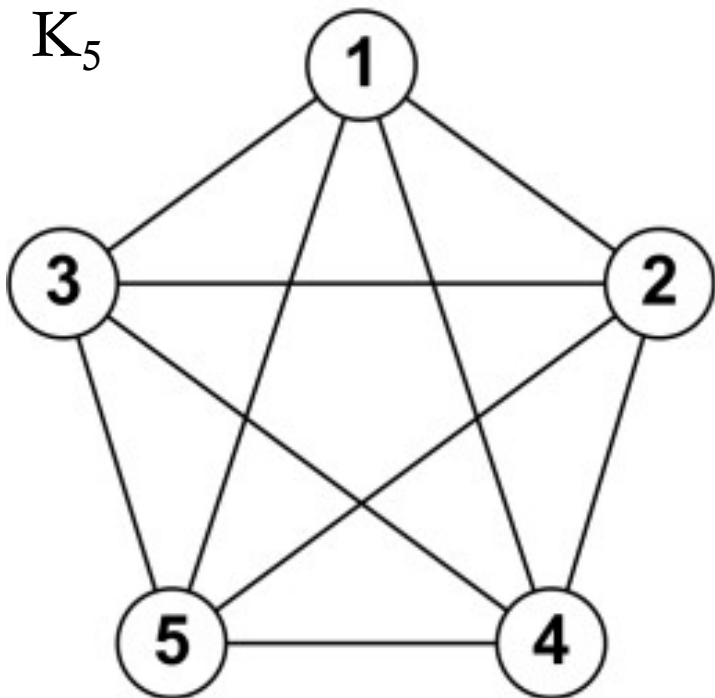
Euler's Formula

- What is Euler's Formula?

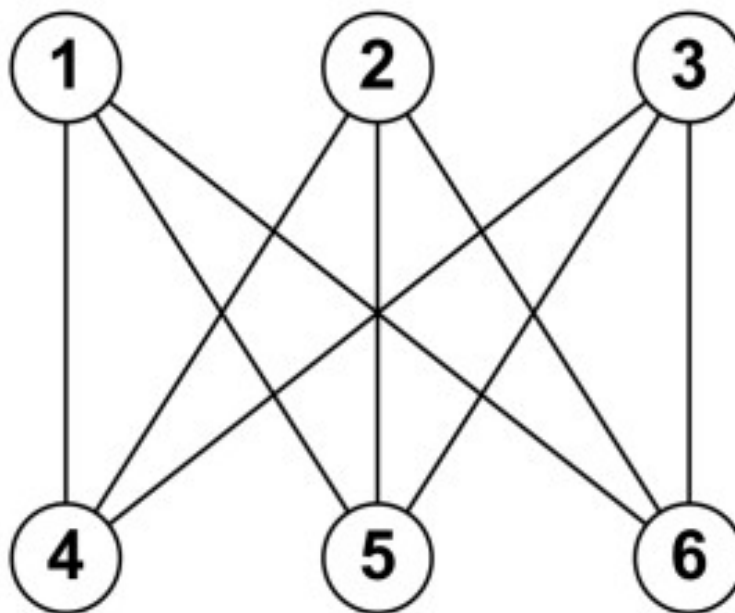
The equation $V - E + F = 2$ is centered within a black oval. The variable 'V' is purple, '-' is black, 'E' is green, '+' is black, 'F' is red, '=' is black, and '2' is black.

- V = Vertices
- E = Edges
- F = Faces

K_5



$K_{3,3}$

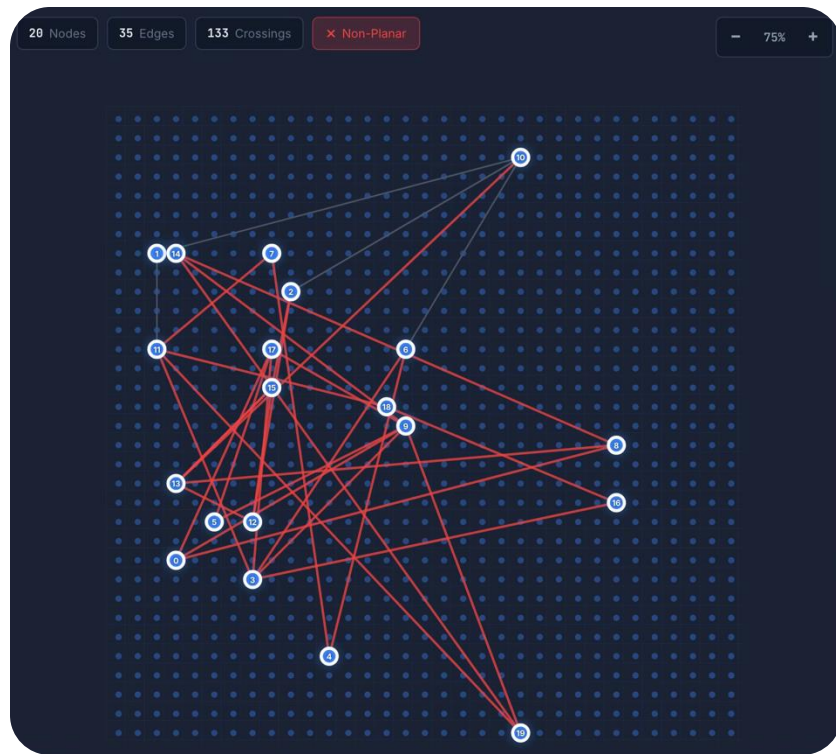


SIMPLE MATH

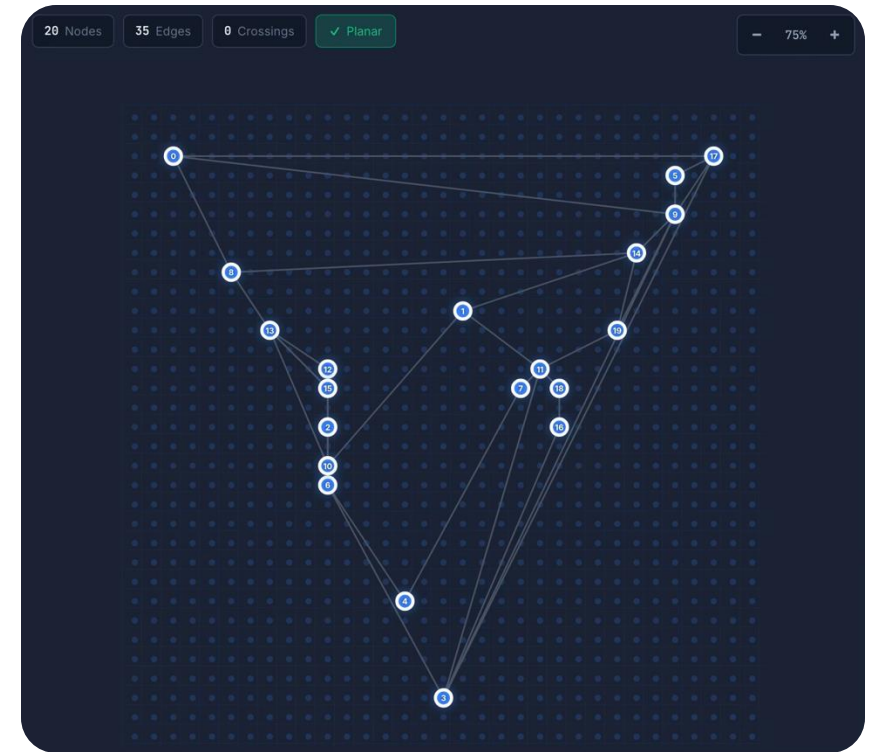
Kuratowski's and
Wagner's Theorem

OUR SOLUTION

A Planarity Checker



- 20 Nodes
- 35 Edges



POSSIBLE REAL WORLD APPLICATIONS

- Electronic Design Automation (EDA): VLSI & Circuit Layout
 - Geographic Information Systems (GIS) & Cartography
 - City Infrastructure Planning
 - Neuromorphic Hardware
-

LIVE DEMONSTRATION

FUTURE UTILIZATIONS

- Network Security & IT : Fixing “Spaghetti Diagrams”
- Circuit Designers : Finding Bottlenecks

THANK YOU FOR LISTENING?
ANY QUESTIONS?
