Title : A Hybrid Proof of Cayley's Tree Formula from Prüfer Codes, Generating Functions and the Matrix–Tree Theorem.

Author(s) :
1. Ganchanapon Photaeng — **Student ID :** 650510568
2. **Student ID :**
3. **Student ID :**

Major : Mathematics

Advisor(s) :
1. Assistant Professor Dr. Thanasak Mouktonglang
2.
3.

Type of presentation* *(choose 1)* **:**

- ☐ **Oral Presentation** (เฉพาะ ตัวแทนนศ.ที่สาขาเลือกให้นำเสนอแบบบรรยาย)
- ☑ **Poster** (กรณี นำเสนอผลงานปัญหาพิเศษ/การค้นคว้าอิสระ)
- ☐ **Cooperative Education** (กรณี นำเสนอผลงานสหกิจศึกษา)

ABSTRACT

Cayley's formula is a fundamental theorem in graph theory for determining the number of labeled trees on a complete graph. Despite its simplicity, the formula can be proven through various methods, reflecting deep connections across mathematical branches. This independent study aims to compare three primary approaches: analytic, combinatorial, and algebraic, while presenting a hybrid proof to develop a unified structural understanding. The techniques employed include generating functions, bijective correspondences, and matrix-based representations.The results demonstrate that all three approaches yield consistent conclusions, providing a systematic perspective on the formula from different mathematical frameworks. The hybrid proof reveals that the formula reflects a common underlying structure shared across disciplines. In conclusion, integrating diverse mathematical concepts enhances a deeper understanding of graph theory and provides a robust framework for investigating related structural problems in mathematics.

**Type of presentation must be matched with an option you choosing on student upload system.*

***The abstract can be more than one page and must be approved by project advisor before upload.*