

# 2025 ICPC team note

Slower than Python3

Nov 2025

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where the path integral is taken counterclockwise.

**Shoelace Lemma**

**Burnside's Lemma**

$$|X/G| = \sum_{g \in G} |X^g|$$

**Pisano Period** Pisano Period refers to the period with which Fibonacci numbers mod some P repeats. In other words, for some modulus P, its Pisano Period is equal to some M such that

$$F_a \equiv F_{(a\%M)} \pmod{P} \quad \forall a.$$

for moduli of form  $10^k$ , its  $15 * 10^k$ .

**Euler Characteristics** For a planar graph, the following identity holds:

$$x = V - E + F$$

where V = vertices, E = edges, F = faces

**König's Theorem** For all Graphs, Minimum Cut = Max flow

Only for **Bipartite Graphs**: Minimum Vertex Cover = Minimum Cut = Max flow (König's Theorem)