ENUMERATING DEGREE SEQUENCES IN DIGRAPHS AND A CYCLE-COCYCLE REVERSING SYSTEM

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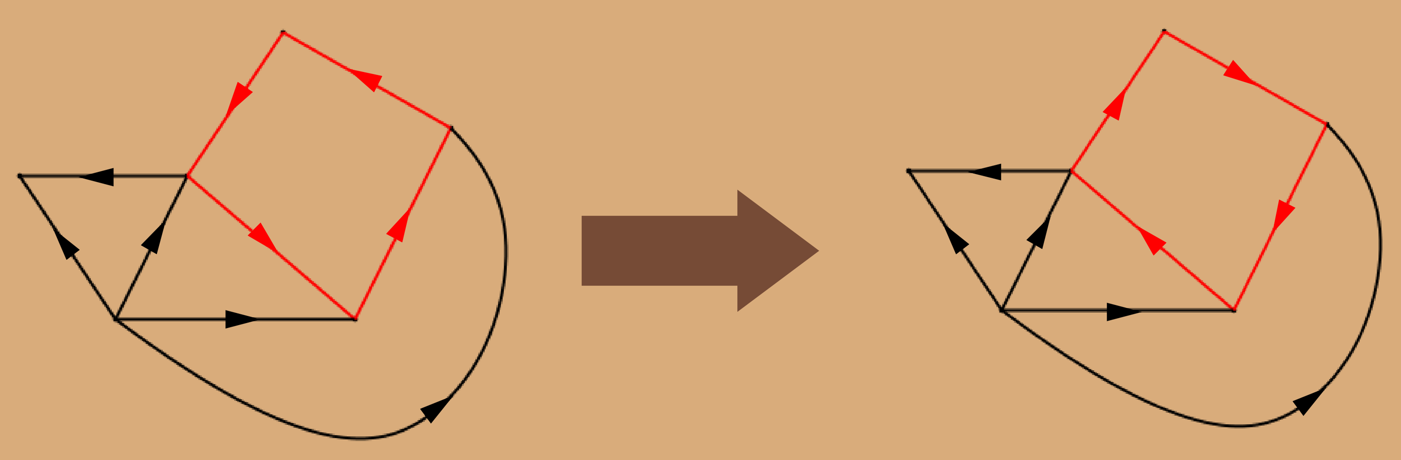
CYCLE REVERSING SYSTEM

- **Given**: graph *G*
- **Operation**: *cycle* reversing
- **Equivalent orientations**: there exists a sequence of cycle reversings



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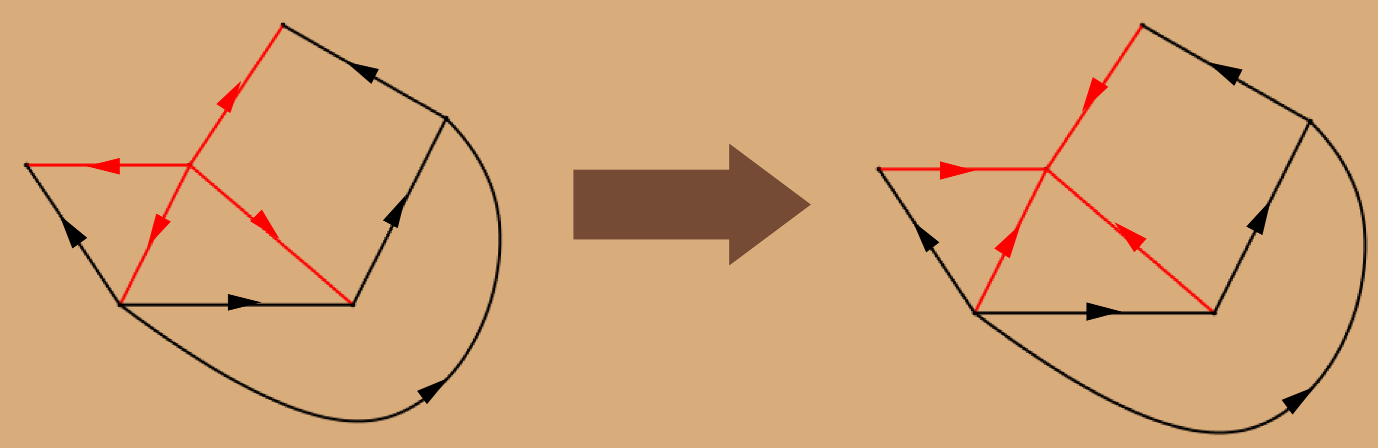
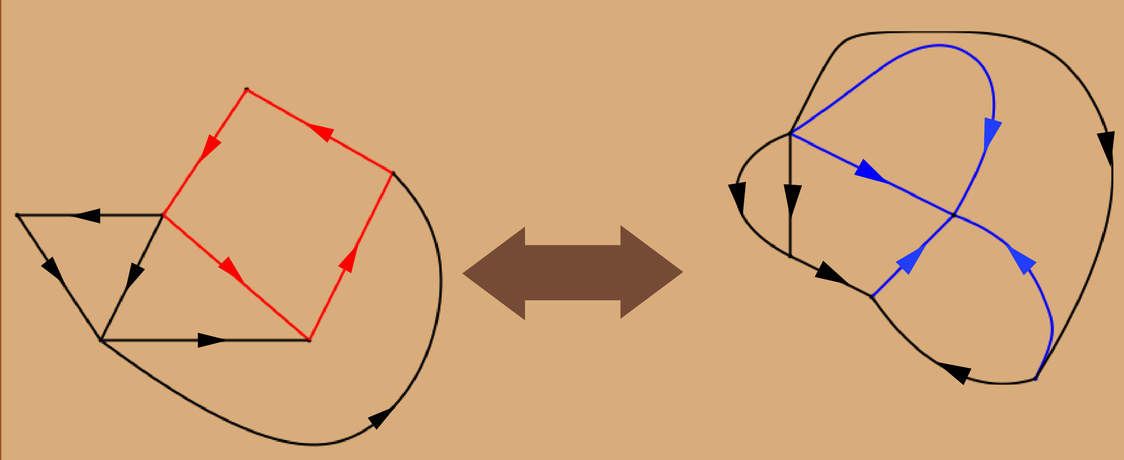


CYCLE-COCYCLE DUALITY



planar graph *G* — graph *G** (dual of graph *G*)

cycle in *G* ⟷ cocycle in *G**

equivalence classes for cycle reversing system for *G* ⟷ equivalence classes for cocycle reversing system for *G**

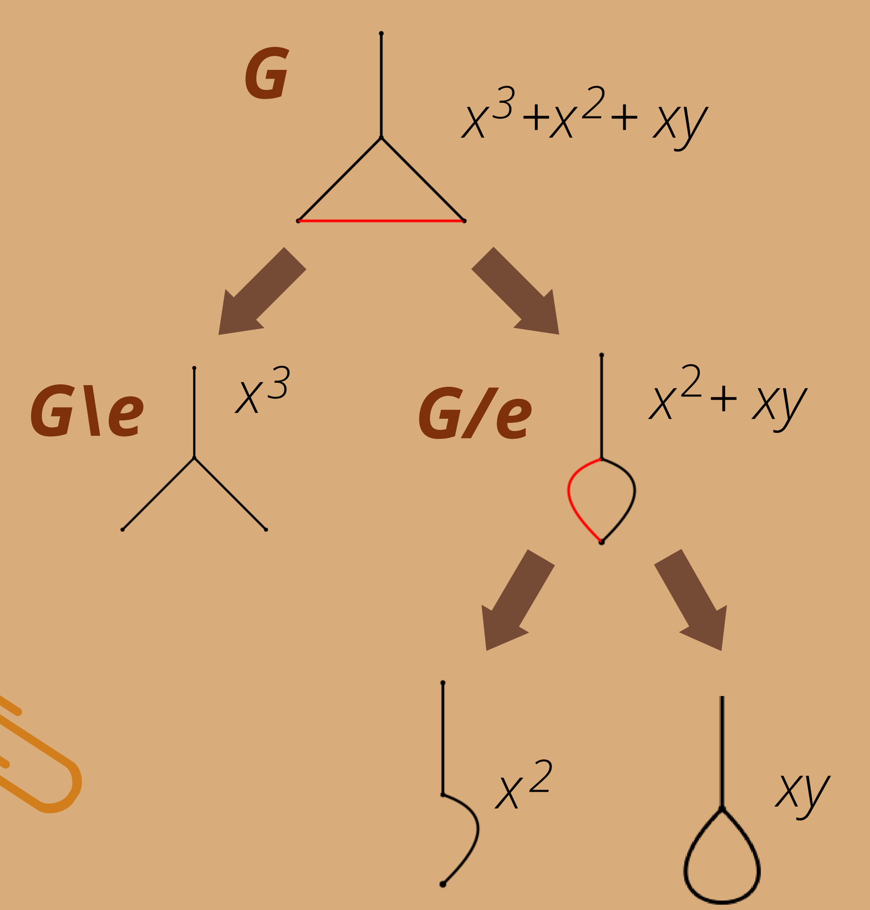
THEOREMS

THEOREM 1
Number of equivalence classes of orientations of graph *G* for cycle reversing system is $t(G; 2, 1)$.

THEOREM 2
Number of equivalence classes of orientations of graph *G* for cocycle reversing system is $t(G; 1, 2)$.

TUTTE POLYNOMIAL

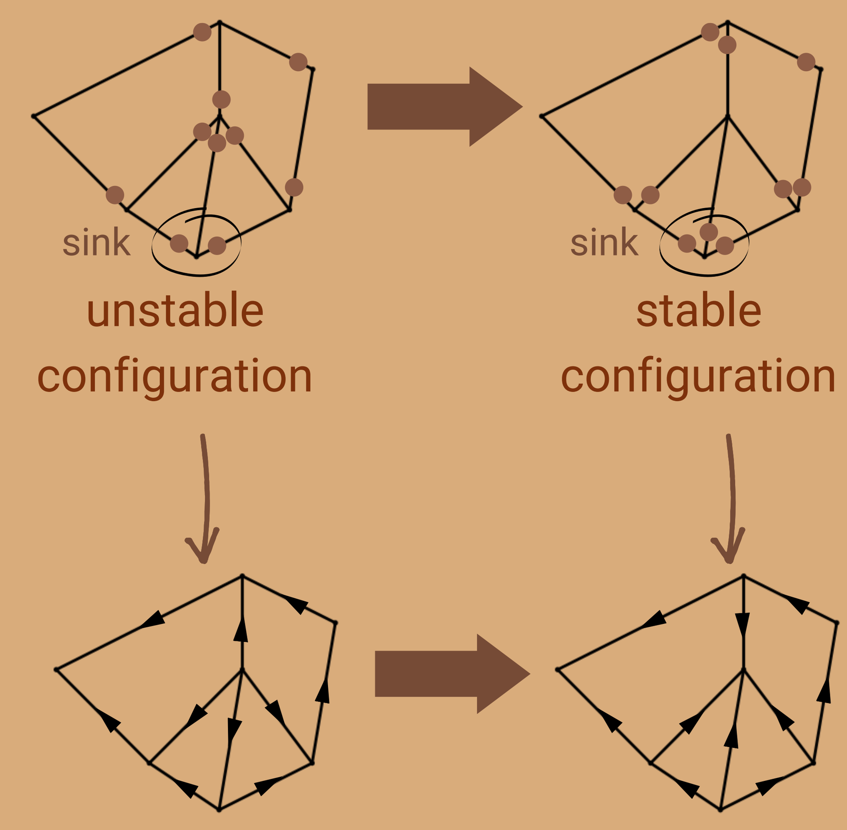
$t(G; x, y)$



DEFINITION

- if e is not a bridge nor a loop
  $t(G; x, y) = t(G\setminus e; x, y) + t(G/e; x, y)$
- if e is a bridge
  $t(G; x, y) = x \cdot t(G\setminus e; x, y)$
- if e is a loop
  $t(G; x, y) = y \cdot t(G\setminus e; x, y)$

SAND-PILE MODEL



THEOREM 3
Number of stable configurations of sand-pile model is exactly the number of equivalence classes of the cocycle reversing system of acyclic orientations.

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REFERENCES

Gioan, E. (2007). Enumerating degree sequences in digraphs and a cycle–cocycle reversing system. European Journal of Combinatorics, 28(4), 1351-1366.