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Summer 2025

Advanced Algorithms

Exercise Sheet 3

Submission: Monday, May 5, 2025, at 11:59 am.

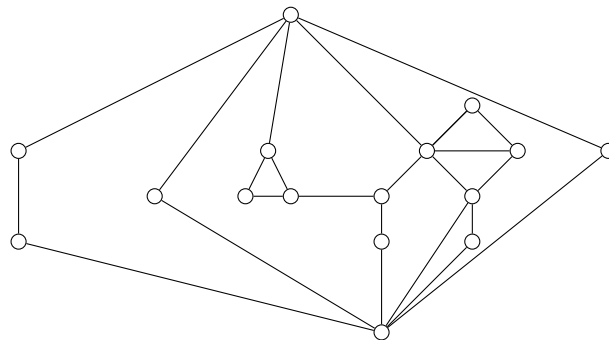
This exercise will be discussed on Wednesday, May 8, 2025.

Exercise 3.1 (Uniqueness in Tutte-Berge Formula?) (4 Points)

Can there be several minimizers U in the Tutte-Berge Formula? Either give an example with several sets U achieving the minimum, or prove that the set U is unique.

Exercise 3.2 (Edmonds-Gallai Decomposition) (8 Points)

Compute the Edmonds-Gallai Decomposition of the following graph.



Exercise 3.3 (Stable Matchings)

(8 Points)

We are given the following preference list

Men	1	2	3	4	5
Björn	Anna	Amy	Nadine	Sabine	Kim
Jan	Nadine	Kim	Amy	Anna	Sabine
Tim	Kim	Sabine	Anna	Nadine	Amy
Tobias	Amy	Nadine	Anna	Kim	Sabine
Bernd	Kim	Nadine	Amy	Sabine	Anna

Women	1	2	3	4	5
Amy	Bernd	Björn	Jan	Tobias	Tim
Kim	Tim	Jan	Tobias	Björn	Bernd
Anna	Jan	Tim	Tobias	Bernd	Björn
Nadine	Björn	Bernd	Tobias	Tim	Jan
Sabine	Tim	Jan	Bernd	Tobias	Björn

Find a stable matching with the Gale Shapley Algorithm. Do this for both cases: First, in the case that the men propose to the women. Second, in the case that the women propose to the men. Compare the two results. Which one is optimal for the women? Why?