

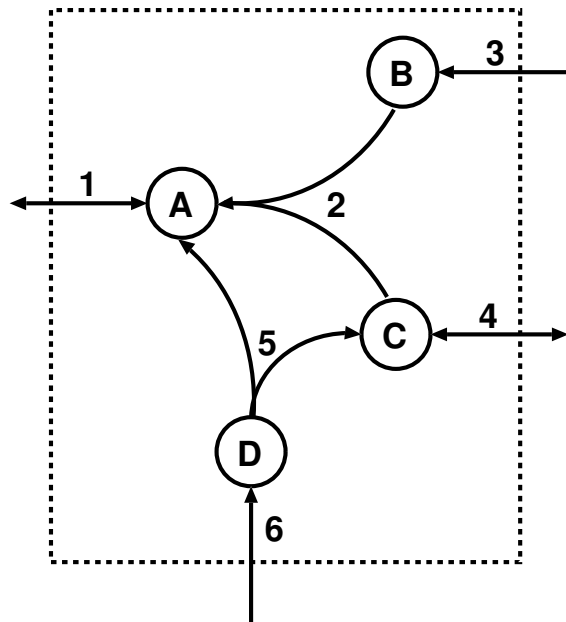
Molekulare Netzwerke SS 14

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1 Exercise

Consider the metabolic network \mathcal{N}



1. Give an inequality description of the steady-state flux cone of \mathcal{N} , assuming that all stoichiometric coefficients belong to $\{0, 1, -1\}$.
2. Determine the elementary flux modes of \mathcal{N} . For each elementary flux mode, give its support and a corresponding flux vector.
3. Determine the minimal metabolic behaviors of \mathcal{N} (using Exercise 2).
4. Determine all pairs of directionally coupled reactions in \mathcal{N} .
5. Which pairs of reactions in \mathcal{N} are fully coupled?

2 Exercise

Given a metabolic network $\mathcal{N} = (S, Irr)$, show that for any minimal metabolic behavior $D \subseteq Irr$ there exists an elementary flux mode e such that $D = \{i \in Irr \mid e_i > 0\}$.

3 Programming Exercise

Rewrite your algorithm from the last exercise. Instead of computing the shortest EFMs it should now compute the shortest GFMs.