

Problem Set 11

This problem set is due Wednesday, December 7 at noon.

1. Recall the cycle fixing procedure in the multiple-source multiple-sink maximum flow algorithm which finds a flow γ' which eliminates residual paths between nodes with positive excess and nodes with negative excess. We saw in class that after all iterations of the efficient implementation of the procedure are done we have the explicit flow η on the edges of the cycle C , and the face prices ϕ only for the faces that are endpoints of dual edges of C . In class we saw how to find a circulation θ such that $\eta + \theta$ is the desired flow γ' by using a single shortest path computation in the dual with respect to the lengths $c - \eta$ (residual capacities), which might be negative. Show how to find such a circulation θ without using an algorithm for shortest paths with negative lengths.
2. Present a drawing of an embedding of $K_{3,3}$ in the projective plane, specify its embedding scheme, and list its facial walks.