6.854 Advanced Algorithms

Problem Set 7

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Collaborators:

Problem 1: Another way to formulate the maximum-flow problem as a linear program is via flow decomposition. Suppose we consider all $s - t$ paths P in the network G and let f_P be the amount of flow on path P. Then maximum flow says to find $z = \max \sum f_P$ subject to $\sum_{P \ni e} f_P \leq u_e$ for all edges e and $f_P \geq 0$ for all paths P. Take the dual of this LP and give an English explanation of the objective and constraints.

Solution: To take the dual of this problem, we must find corresponding variables for each of the constraints. Let y_e be the variables in the dual corresponding to the constraints $\sum_{P \ni e} f_P \leq u_e$. $\square$