These problems are coupled by complementarity conditions

\[(\lambda_i^1)_{kK} f_k = 0 \quad K = 1 \ldots \#E\]

\[(\lambda_i^2)_{kK} (e_k - f_k) = 0 \quad K = 1 \ldots \#E\]

(i.e. either the inequality is active or its Lagrange multiplier is 0)

Flow's

Now \((\lambda_i^1)_{kK} = 0\) implies that flow is \(> 0\)

\((\lambda_i^2)_{kK} = 0\) """" < e

- The non-zero \(\lambda_i^1\)'s identify edges that could disconnect (i.e., any path containing one is not augmenting)
- If the non-zero \(\lambda_i^2\)s meet the equality, we have a cut
There is a general point here

consider \( (f, \lambda^1_c, \lambda^2_c, \lambda^1_e) \equiv (p, d) \)

primal vars \[\rightarrow\] dual vars.

1) At a solution if \( p \) is soln to primal, \( d \) is soln to dual.
   \( p, d \) are complementary

   (follows from KKT).

2) if \( (p, d) \) are complementary and
   \( p \) is primal feasible and
   \( d \) is dual feasible then

   \( p \) solves primal \( \iff \) \( d \) solves dual.