We consider the demand matching problem where we are given a simple bipartite graph $G = (V,E)$, a demand $d_e$ and profit $\pi_e$ for each edge $e \in E$ and capacity $b_v$ for each vertex $v \in V$. A subset $M$ of edges is called a demand matching if the sum of demands of edges chosen in $M$ incident at $v$ is at most $b_v$ for each vertex $v$. The goal of the demand matching problem is to select a demand matching $M$ which maximizes the sum of profit of edges in $M$.

In this paper we give nearly tight upper and lower bounds on the integrality gap of a natural linear programming relaxation for the problem. We show that the integrality gap of the linear program is closely related to finding probability distributions over independent sets of a tree that satisfy certain marginal as well as pairwise correlations. We give a nearly tight characterization for such distributions. We use this characterization to bound the integrality gap of the linear programming relaxation for the demand matching problem in the interval $[2.6999, 2.7086]$. (Received September 15, 2013)