Probabilistic Methods
Homework #9
Due: *Thursday, January 16th*

Problem 11

Let as assume that a connected d-regular **bipartite** graph $G = (V_1 \cup V_2, E)$ on $2n$ vertices has eigenvalues

$$d = \lambda_1 \geq \lambda_2 \geq \cdots \geq \lambda_{2n} = -d$$

and

$$\hat{\lambda} = \max_{2 \leq i \leq 2n-1} |\lambda_i| .$$

For sets $A \subseteq V_1$ and $B \subseteq V_2$ contained in different parts of the bipartition, estimate from above the difference

$$\left| e(A, B) - \frac{d}{n}|A||B| \right|.$$