1. Give a factor $1/2$ approximation algorithm for the MAX-CUT.

2. Let $P \in F[x_1, x_2, \cdots, x_n]$ be a non-zero polynomial of total degree $d \geq 0$ over a field, F. Let S be a finite subset of F and let $r_1, r_2, \cdots, r_n$ be selected at random independently and uniformly from S. Prove that

$$\Pr[P(r_1, r_2, \cdots, r_n) = 0] \leq \frac{d}{|S|}.$$