

CSDS 455: Applied Graph Theory

Homework 15

Due Wednesday, October 14 at the start of class

**Homework rules:** You are welcome to work with others to solve these problems. If you do get help from someone else (or from some other resource), please indicate that on your homework.

Please read the statement and intuition about Szemerédi's regularity lemma.

**Problem 1:** In the definition of  $(A, B)$  as an  $\epsilon$ -regular pair (or  $\epsilon$ -pseudo-random pair), what is the purpose of the requirement that for every subset  $X \subseteq A$  and  $Y \subseteq B$ ,  $|X| \geq \epsilon|A|$  and  $|Y| \geq \epsilon|B|$ ?

**Problem 2:** Prove that any  $\epsilon$ -regular pair in  $G$  is also  $\epsilon$ -regular in  $\overline{G}$ .