


# Regularity Lemma (Szemerédi)

$\forall G \exists \varepsilon$ -regular  ,  $k \leq RL(\varepsilon)$   
 $v_1 \dots v_k, |V_i| \approx n/k$

[OR edge-weighted  $R = ([k], \text{densities})$   
"approximates"  $G$  well ]

↑ Quantify?

Observation  $\forall S, T \subseteq V(G)$   
 $e(S, T) = \#\{(s, t) : s \in S, t \in T, st \in E\}$

is within  $\pm 2\varepsilon n^2$  from

$$\sum_{i, j} |S \cap V_i| \cdot |T \cap V_j| \cdot \text{density}(V_i, V_j)$$