

# Weak Regularity Lemma -5-

(Frieze-Kannan)

Given  $f \in \mathcal{W}$  & partition  $\mathcal{P}$ ,

$$I = I_1 \cup \dots \cup I_k,$$

$f_{\mathcal{P}}$  is the step-like function whose value on  $I_i \times I_j$  is

$$\frac{1}{\lambda(I_i)\lambda(I_j)} \int_{I_i \times I_j} f(x, y) dx dy. \quad [f_{\mathcal{P}} \in \mathcal{W}]$$

Weak RL:  $\forall \epsilon > 0 \forall f \in \mathcal{W}$

$\exists$  partition  $\mathcal{P}$  with  $\leq 2^{2/\epsilon^2}$  parts

s.t.

$$\|f - f_{\mathcal{P}}\|_{\square} < \epsilon.$$