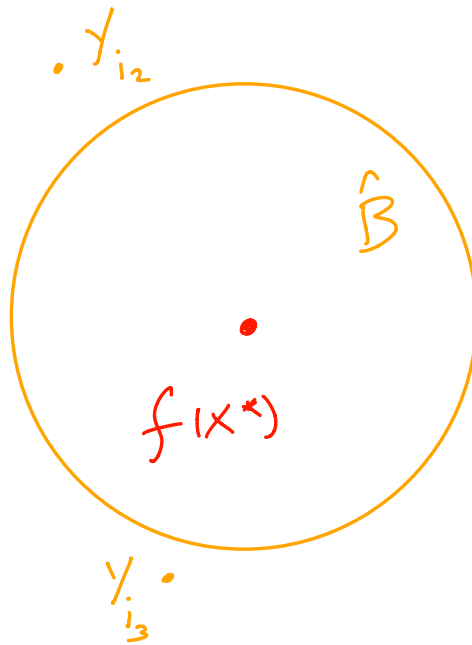


$$f: X \rightarrow Y$$

$$\underbrace{x_i \rightarrow x^*}_{\text{b.w.}} \quad \underbrace{f(x_i) \not\rightarrow f(x^*)}_{\text{b.w.}}$$

$$y_i \equiv f(x_i)$$

$$\underbrace{\{y_i\}_{i=1}^{\infty}} \subset Y$$



$$N < i_1$$

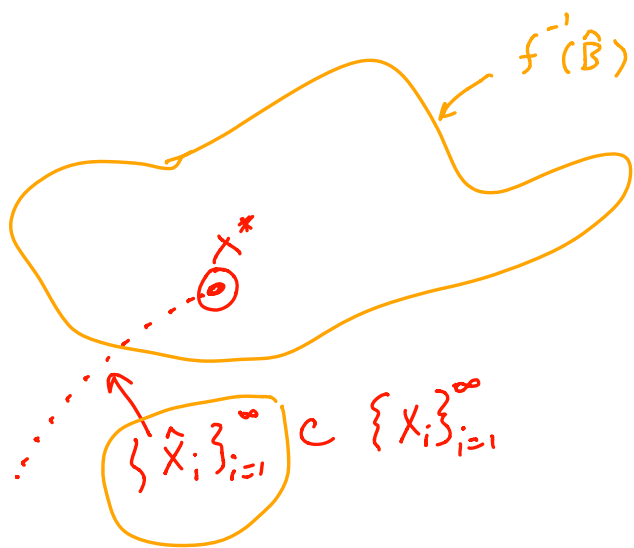
$$1000N < i_2$$

$$y_{i_1}$$

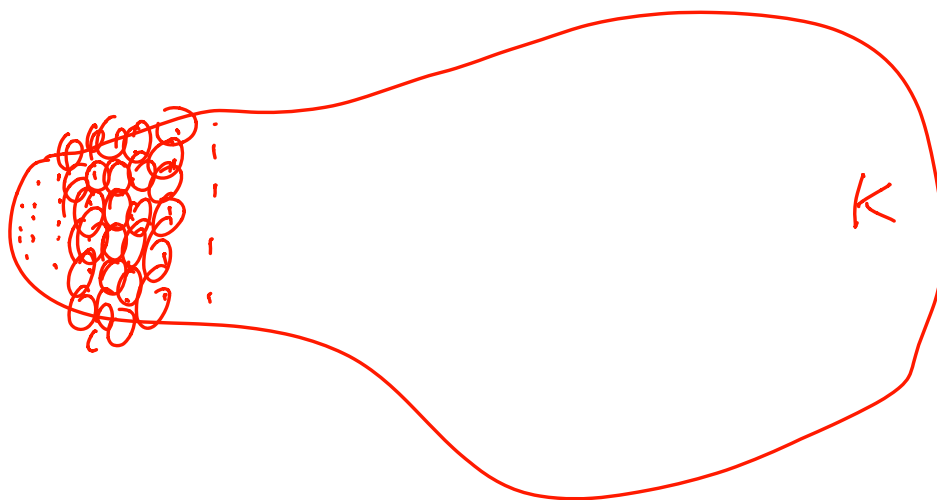
$$10''N < i_3$$

$$\{ \hat{y}_i \}_{i=1}^{\infty} = \text{the } y_{i_j} \text{ outside } \hat{B}$$

$$\{ \hat{x}_i \}_{i=1}^{\infty}$$



$\{y_i^\epsilon\}$



$$K \subset \bigcup_{i=1}^{N_\varepsilon} \overbrace{B(y_i^\varepsilon, \varepsilon)}$$

$$\{y_i^\varepsilon\}_{i=1}^{N_\varepsilon} \subset K$$

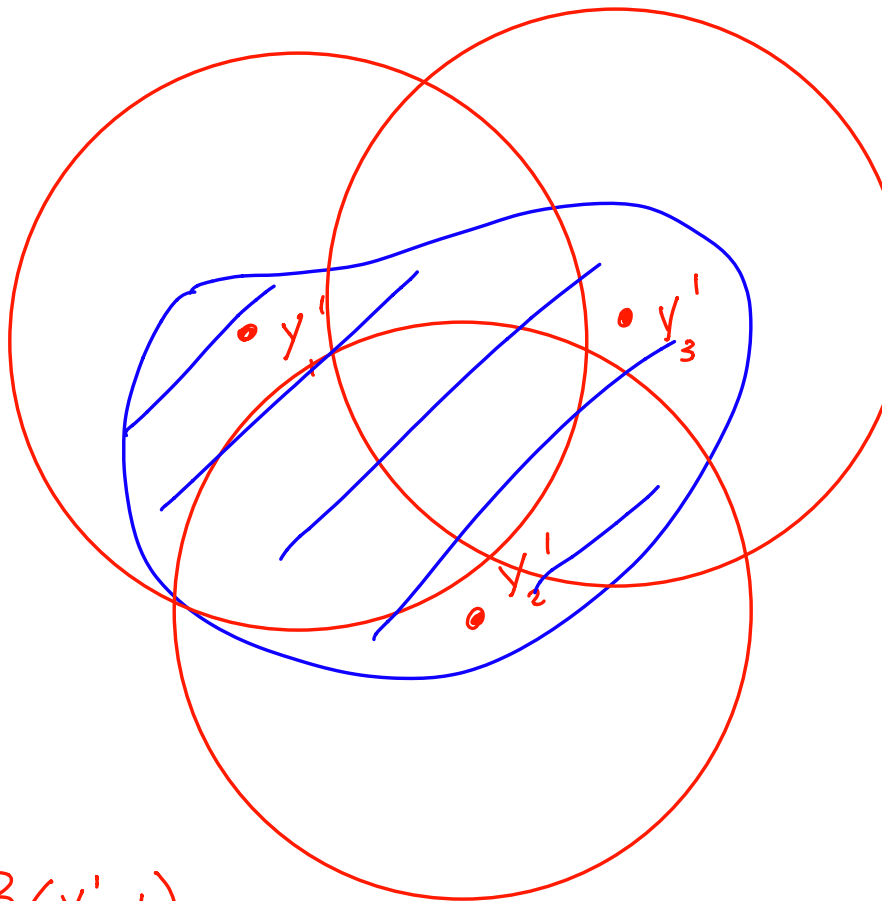
$$\varepsilon_1 = \frac{1}{2}$$

$$\varepsilon_2 = \frac{1}{4}$$

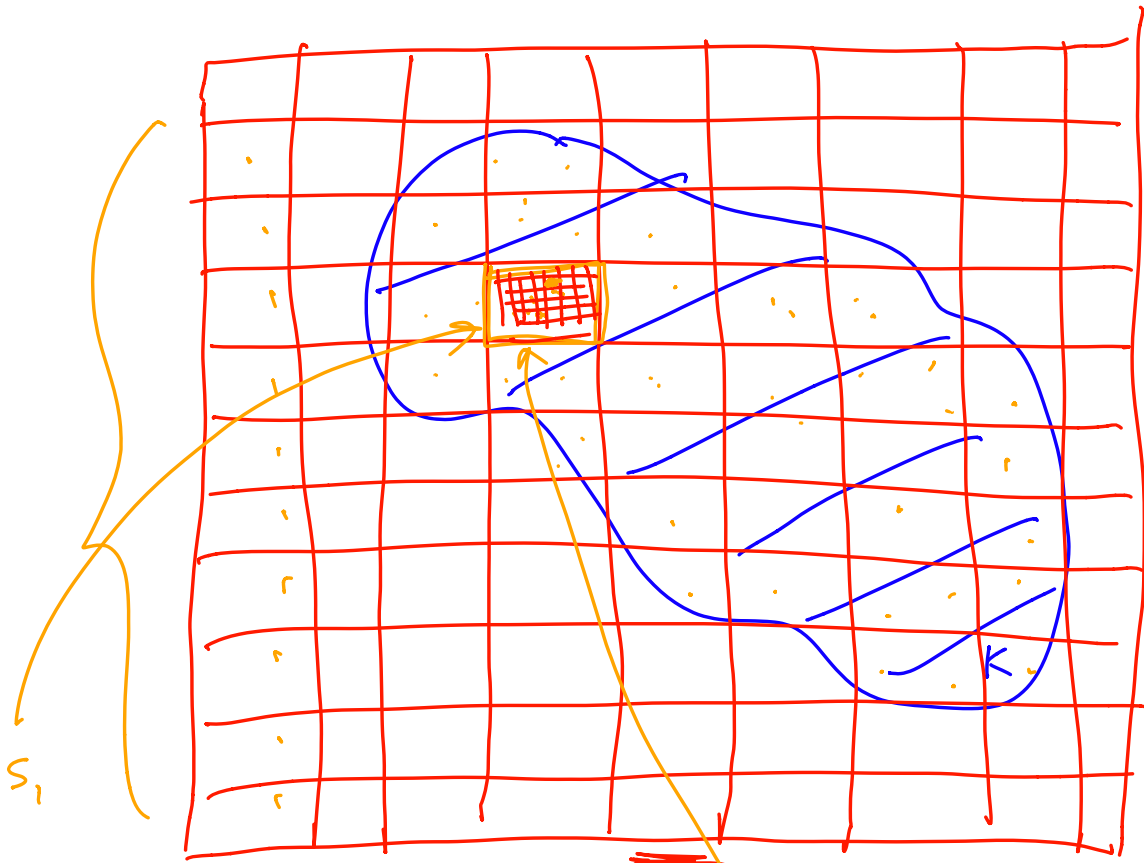
$$\varepsilon_3 = \frac{1}{8}$$

$$\varepsilon_4 = \frac{1}{16}$$

...



$$K \subset \bigcup_{i=1}^{N_\varepsilon=3} B(y_i^1, 1)$$



$\sqrt{2}$

$\{X_i\}_{i=1}^{\infty}$

$\{X_i\}_{i=1}^{\infty}$

$X_5 \quad X_{33} \quad X_{34} \quad X_{156}$
 $X_5 \quad X_2 \quad X_3 \quad X_4$

$\hat{X}_1 = X_5, \quad \begin{pmatrix} 1 \\ X_2 \end{pmatrix} = X_{156},$

$$\begin{array}{ll}
S_1 & 1 \times 1 & X_1 \equiv \{x_i\}_{i=1}^{\infty} \cap S_1 \\
S_2 & \frac{1}{10} \times \frac{1}{10} & X_2 \equiv \{x_i\}_{i=1}^{\infty} \cap S_2 \\
S_3 & \frac{1}{100} \times \frac{1}{100} & X_3 \equiv \{x_i\}_{i=1}^{\infty} \cap S_3 \\
& & \vdots \\
S_4 & \frac{1}{1000} \times \frac{1}{1000} &
\end{array}$$

$$S_1 \supset S_2 \supset S_3 \supset \dots$$

$$\hat{X}_1 = x_{i_1} \in X_1$$

$$\hat{X}_2 = x_{i_2} \in X_2 \quad \ni \quad i_2 > i_1$$

$$\hat{X}_3 = x_{i_3} \in X_3 \quad \ni \quad i_3 > i_2$$

$$\vdots$$

$$\text{diam}\{X_k\} \leq 2\sqrt{\frac{1}{10^k}} \rightarrow 0$$

\hat{X}_K is Cauchy

$\Rightarrow \hat{X}_K \rightarrow X^*$ some $X^* \in K$

$$\{\hat{X}_K\}_{K=1}^{\infty} \subset \{X_i\}_{i=1}^{\infty}$$