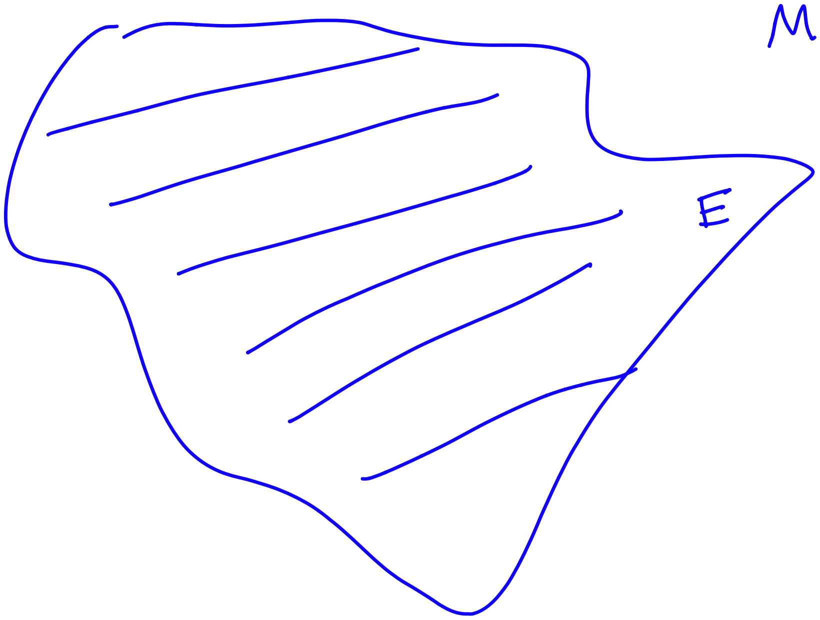
Decide due dates



$E \subset M$

M is separable

Separable $\equiv$ there is a countable dense subset $F = \{f_i\}_{i=1}^{\infty}$

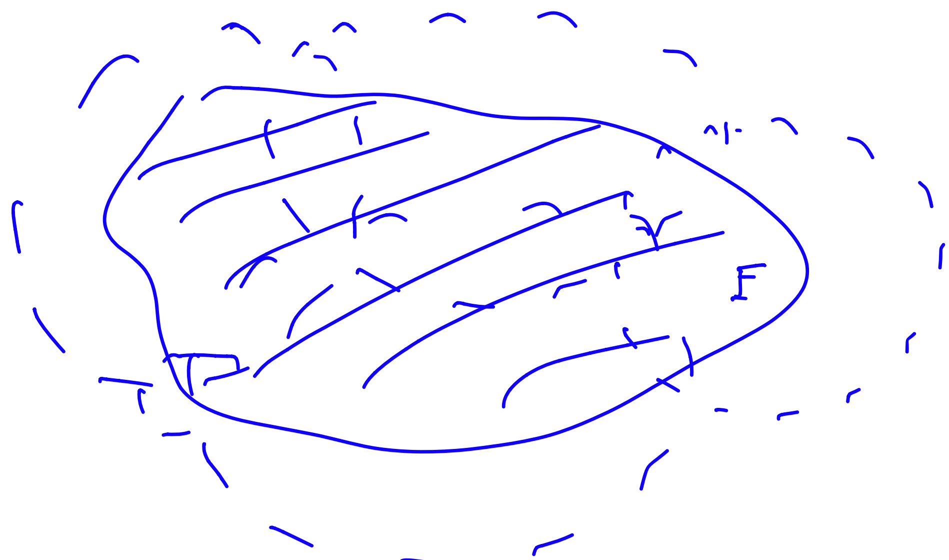
I.e. $\forall\ x \in M$ and all $\varepsilon > 0$

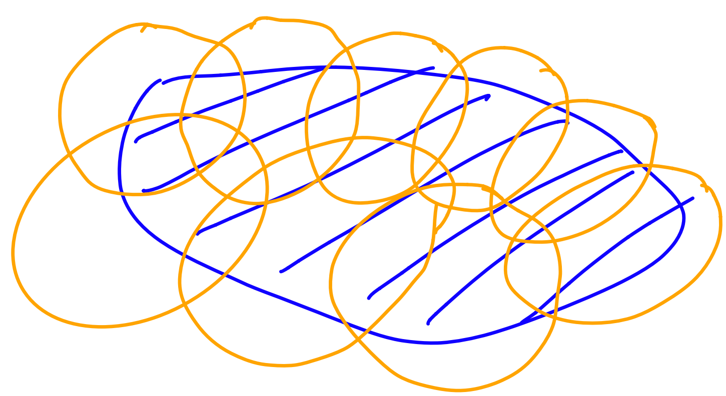
$\exists\ f_i \in F \ni \rho(x, f_i) < \varepsilon$

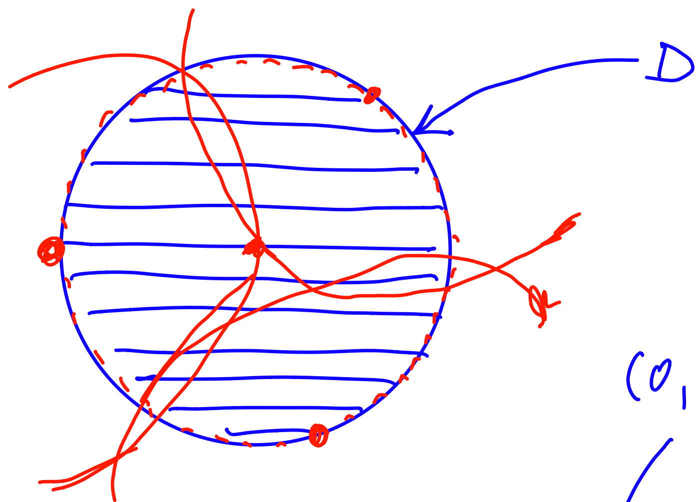
Open covers: $\mathcal{O} = \{O_\alpha\}_{\alpha \in A}$ open

$\mathcal{O}$ is an open cover of E if $E \subset \bigcup_{\alpha \in A} O_\alpha$

Exercise: Show that every open cover of a subset $E \subset M$ where M is separable has a countable subcover.







$(0, 1]$

$$\mathcal{O} = \{ O_{x,r} \mid x \in D, \ 0 < r \le 1 \}$$

$$O_{x,r} = \underline{B(x,r)}$$

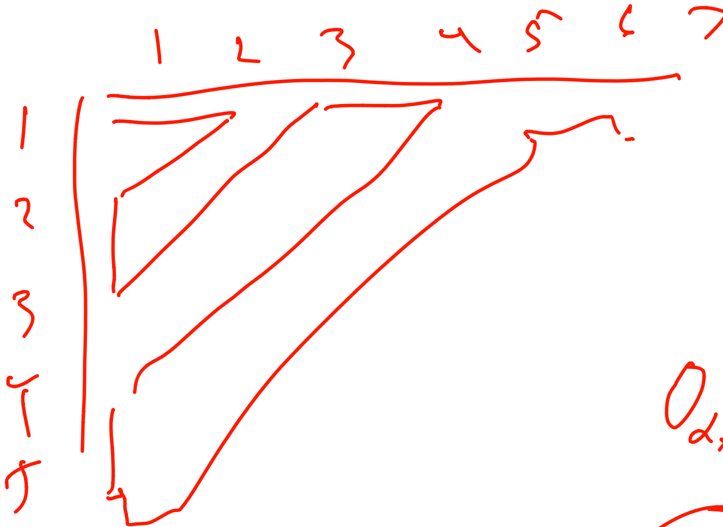
$$D \subset \bigcup_{x,r} O_{x,r}$$

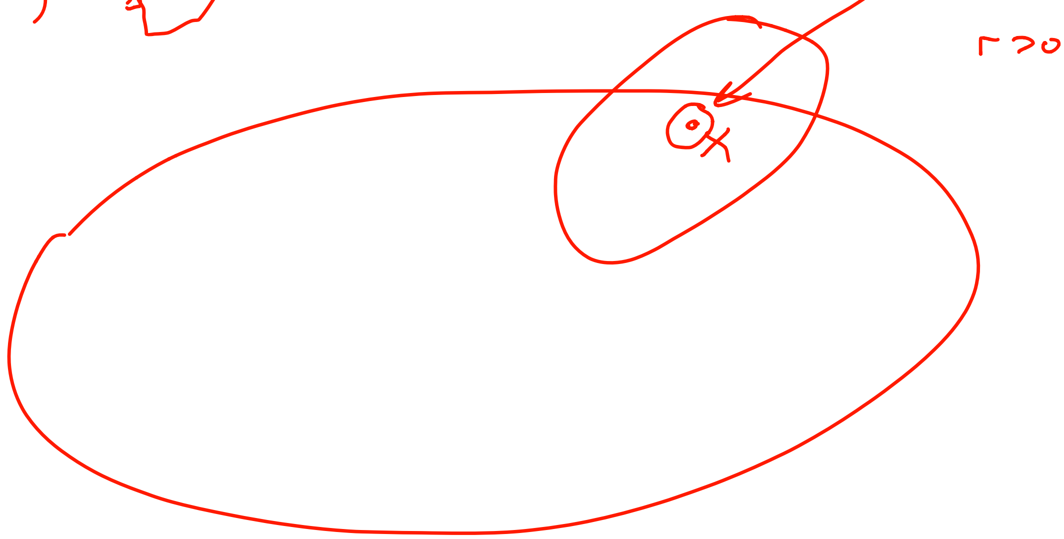
$$\{f_i\}_{i=1}^{\infty} \subset M$$

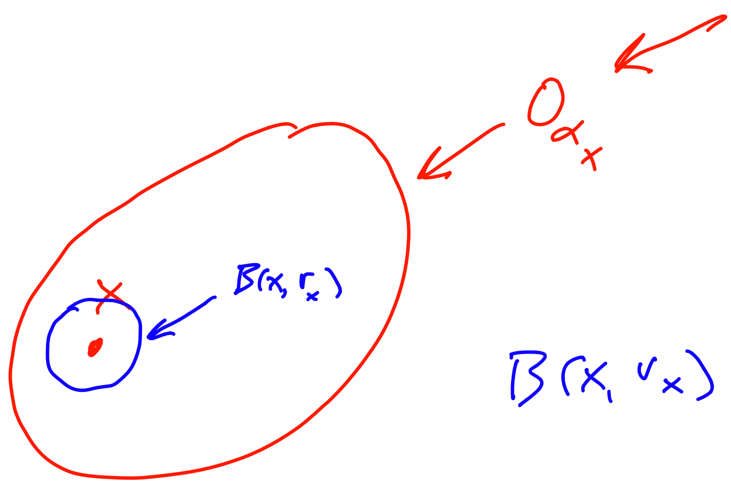
$$\underline{\{B_k\}_{k=1}^{\infty}}$$

$$\underline{\left\{ B\left(f_i, \tfrac{1}{2^j}\right) \right\}_{i,j}^{\infty,\infty}}$$

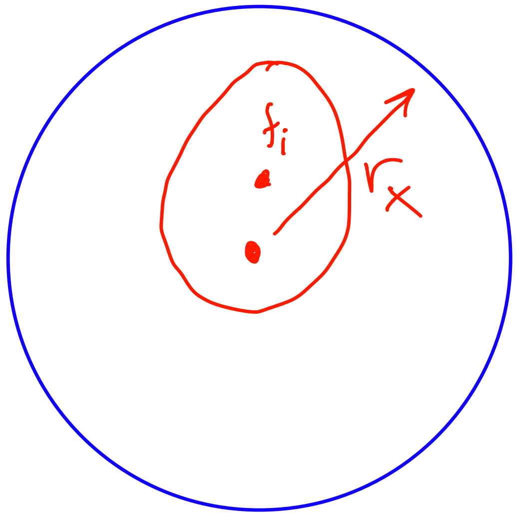
$i = 100$
$j = 3000$







$$B(x, r_x) \subset O_{\alpha_x}$$



$\frac{1}{2^j} < r_x$ for some j

$\frac{1}{2^{j+2}}$

$\frac{1}{2^{j+1}}$