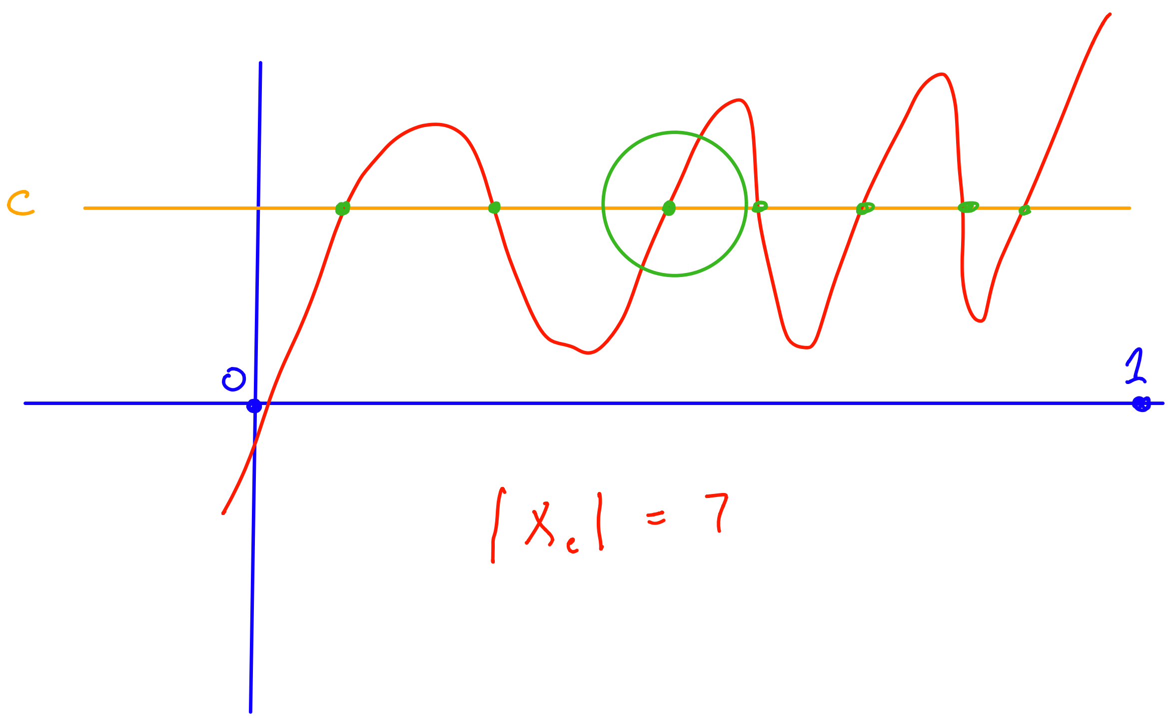
$f : [0,1] \subset \mathbb{R} \to \mathbb{R}$

$X_c = \{ x \mid f(x) = c \}$ $|f'(x)| \geq \alpha > 0$

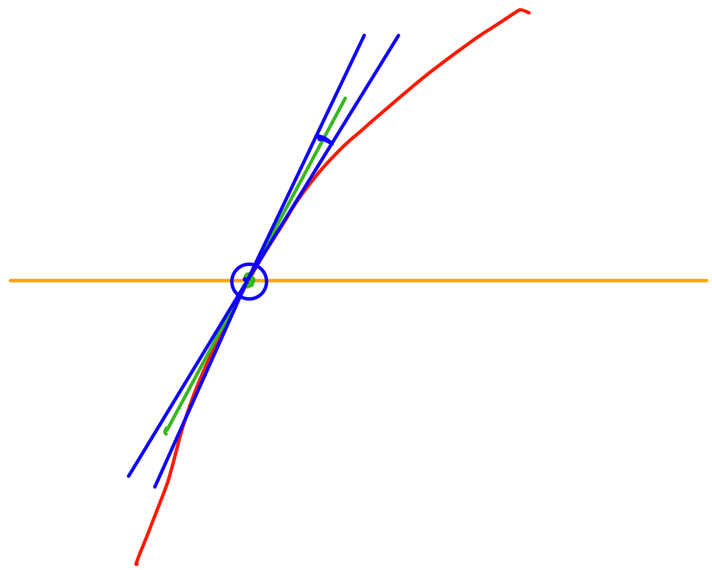
if X_c regular, $f'(x) \neq 0$ $\forall x \in X_c$

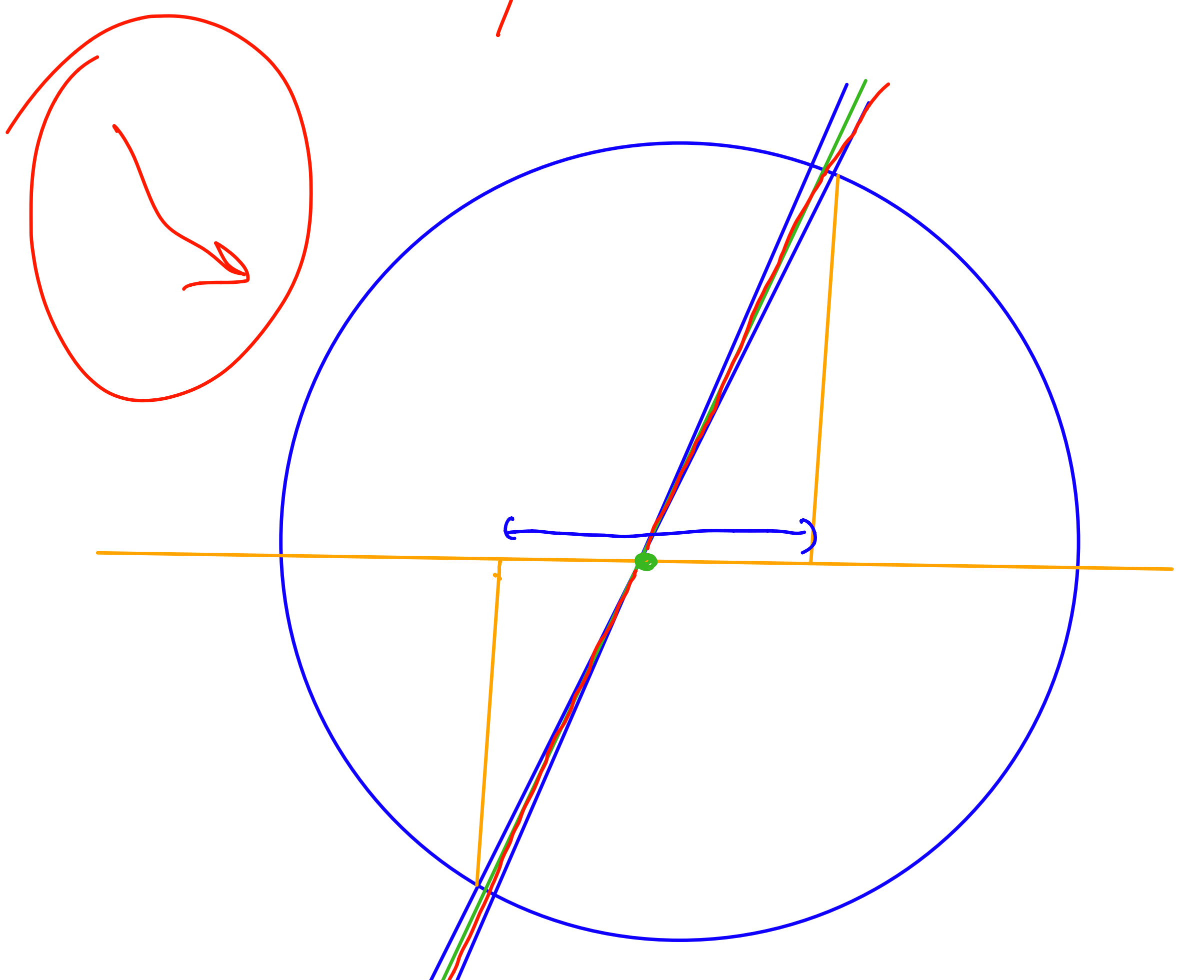
then $|X_c| < \infty$

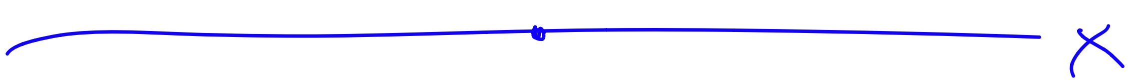
$|E| =$ # of points in set E

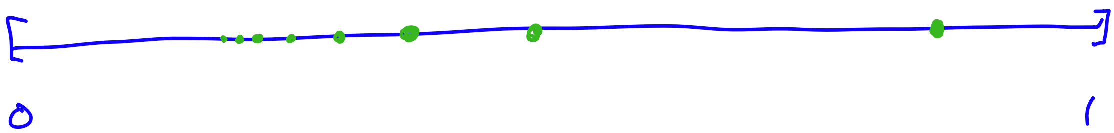


$|X_c| = 7$






x



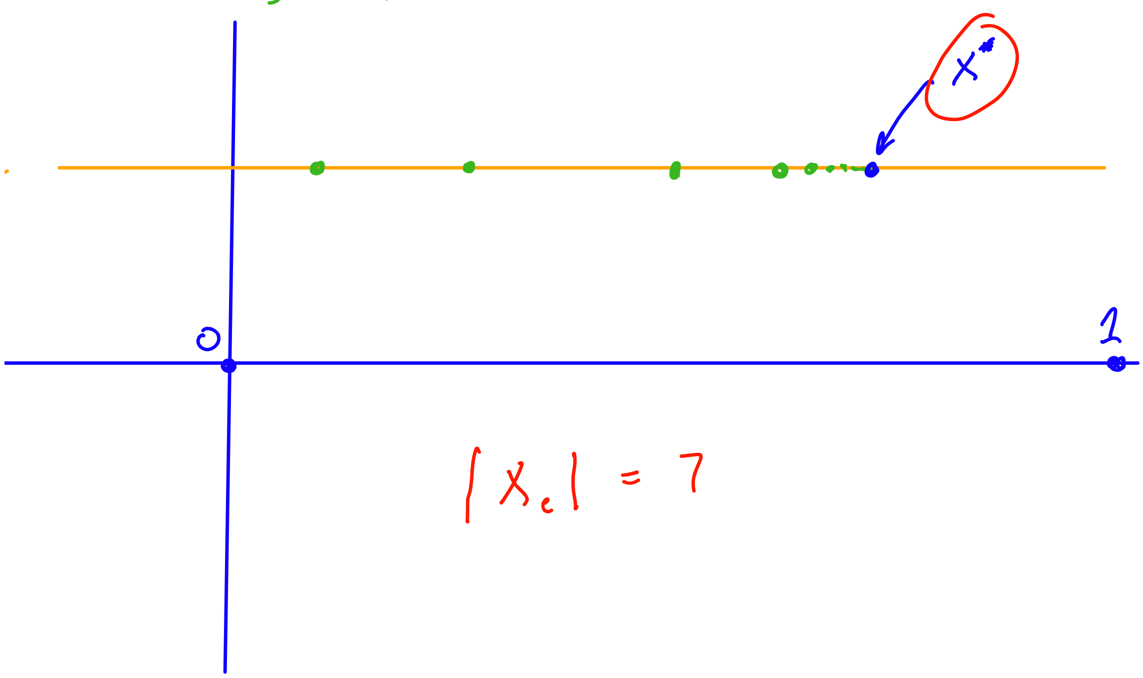
$$f(x) = c \quad \forall\, x \in X_c$$

$\Rightarrow f(x^*) = c$ if $x^* =$ cluster point of X_c

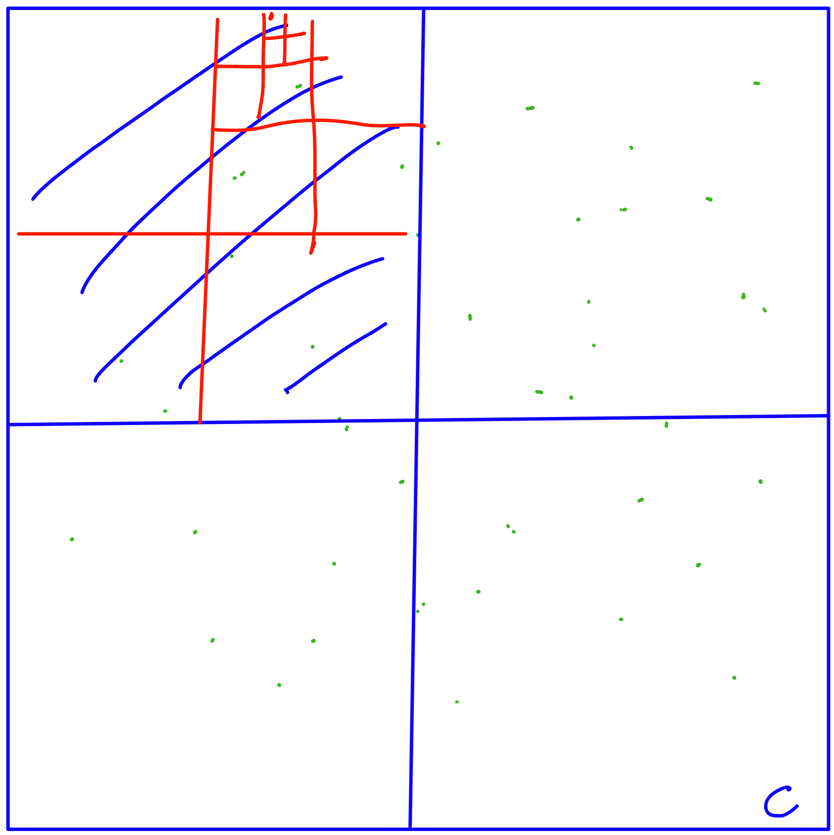
i.e. if $\exists \{y_i\}_{i=1}^{\infty} \subset X_c$ $\ni$ $x^* = \lim_{i \to \infty} y_i$

$x^* \in [0,1]$

$f'(x^*)$ exists



$$|X_c| = 7$$



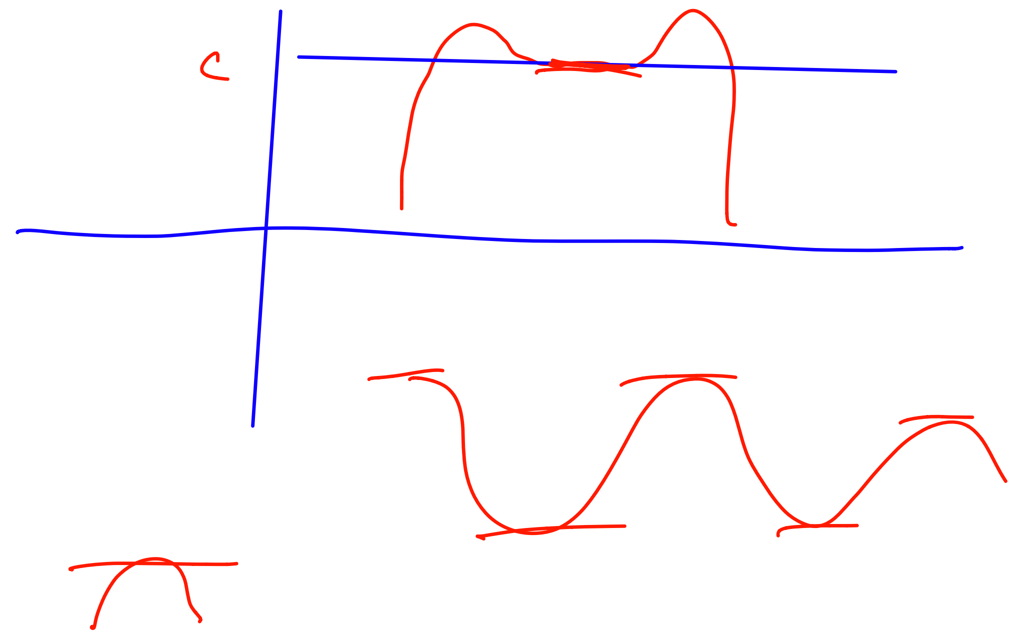
8.4.2

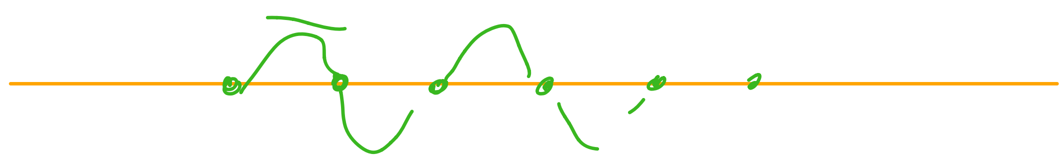
$f : [0,1] \to \mathbb{R}$ diff

$\left| \left\{ x \mid \frac{df}{dx}(x) = 0 \right\} \right| < \infty$

$X_c = \{ x \mid f(x) = c \}$

prove $|X_c|$ is finite





mean value theorem