Tuesday 1:00–2:00 Enrique and Yunfeng

Thursday 11:00–12:00 Katrina

Monday 4:30 - 5:30 (6:00) K.R.V.

Wednesday 4:30 - 5:30 (6:00) K.R.V.

4.2.2

open set:

E is open if $\forall x \in E$

$B(x, r) \subset E$ for some

$r > 0$

closed

F closed

$\Updownarrow$

F^c open

4.3

$$\{x_i\}_{i=1}^{\infty} \longrightarrow x^*$$

if

$$\rho(x_i, x^*) \xrightarrow[i \to \infty]{} 0$$

(I) f cont. if

$\longrightarrow f^{-1}(E)$ is open when

E is open.

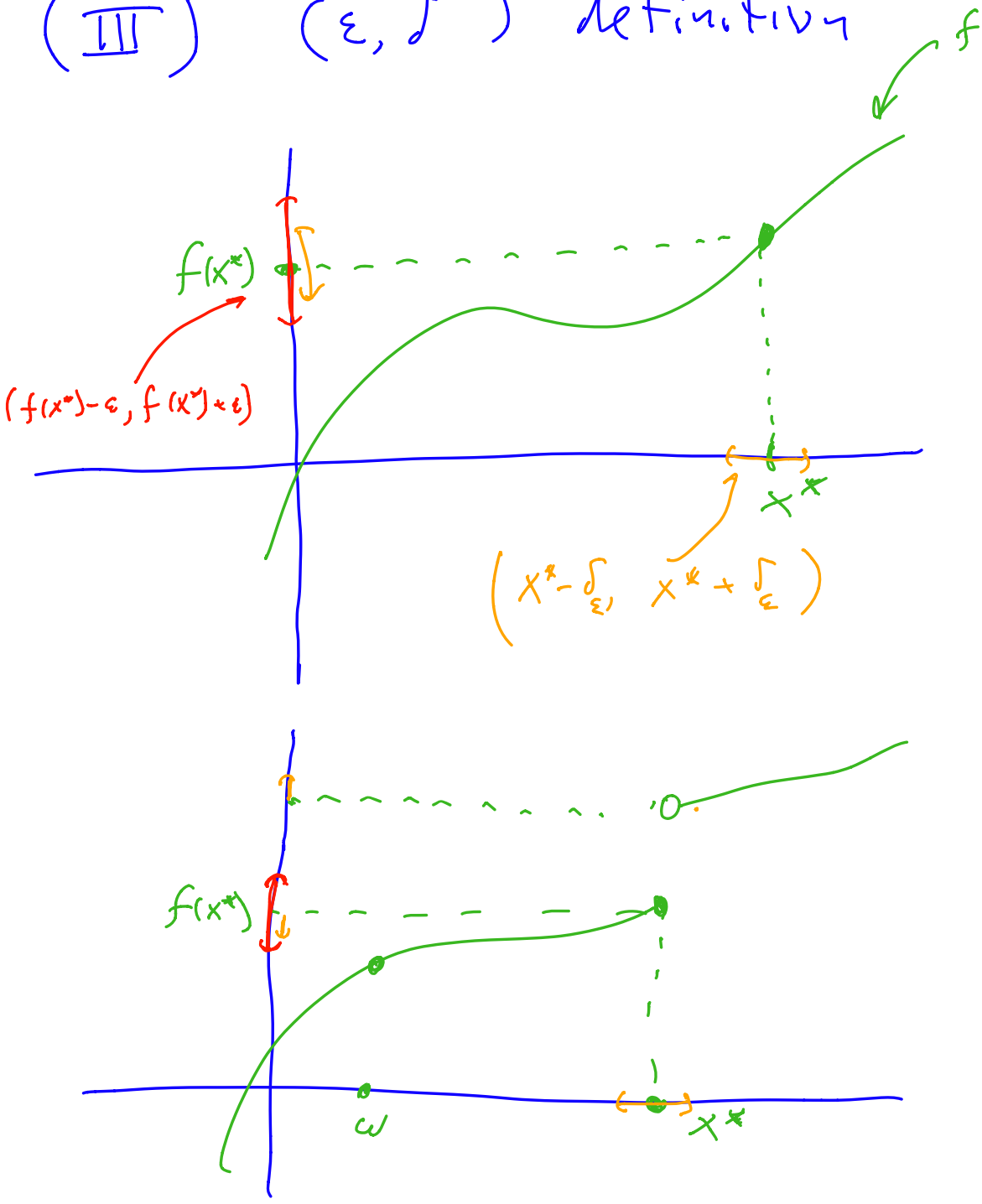
$$f : X \longrightarrow Y$$

f is continuous if inverse image of open is open

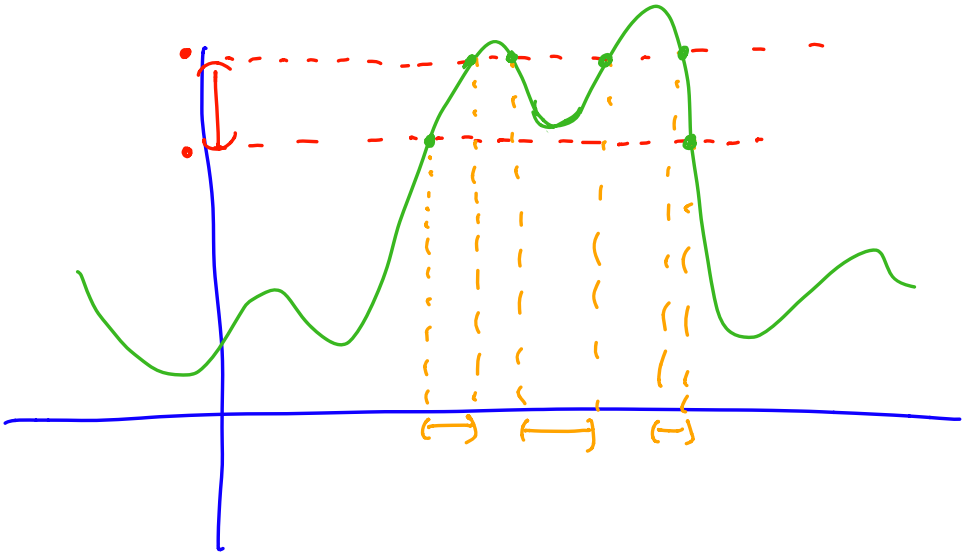
(II) f is continuous if

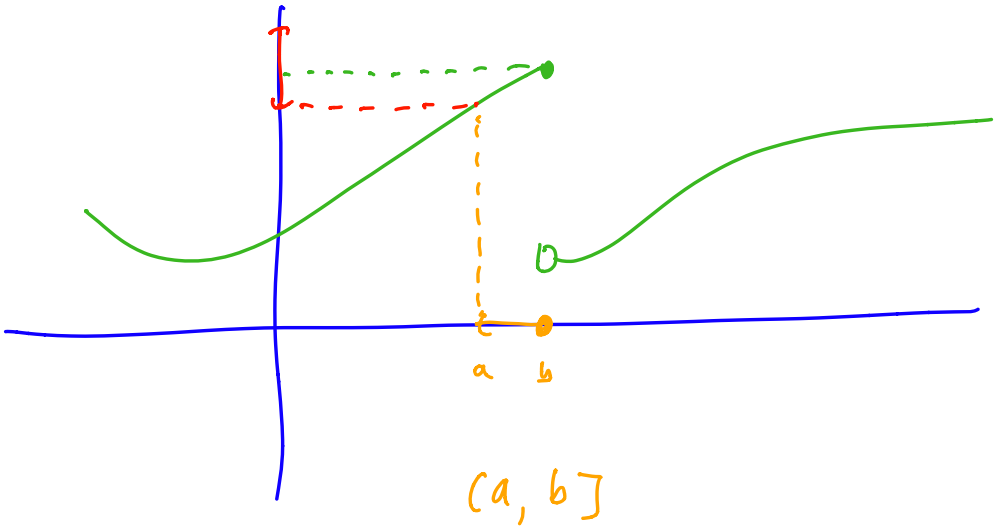
$$x_i \longrightarrow x^* \Rightarrow f(x_i) \to f(x^*)$$

(III) (ε, δ) definition



(figure 19 in chapter 4)





$(a, b]$

We are assuming ε-δ Def — Def (III)

$f : X \to Y$

(1) observation: $E \subset Y$ is open if $\forall\ y \in E\ \exists\ B(y,r) \subset E$

(2) we want to show $f^{-1}(E)$ is open

so pick $x \in f^{-1}(E)$

$\Rightarrow$ $f(x) \in E$

use (1) to get that $\exists\ r > 0\ \ni$

$B(f(x), r) \subset E$

(3) Def III $\Rightarrow \exists\ \delta(r)\ \ni$

$f(B(x, \delta(r))) \subset B(f(x), r) \subset E$

(4) $\Rightarrow B(x, \delta(r)) \subset f^{-1}(E)$

(5) we have shown

E open $\Rightarrow f^{-1}(E)$ open

assume definition III

III $\Rightarrow$ I