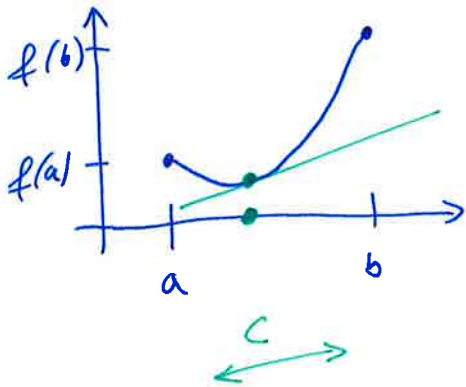


GRAAFISIA TÄHTÄVIÄ

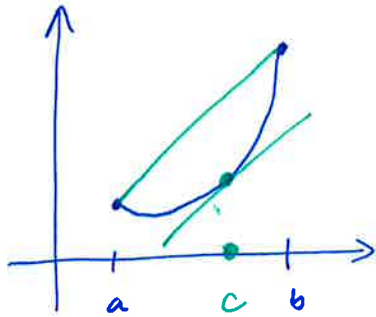
① ETSI $c \in (a, b)$, JOLLE $f'(c) = \frac{f(b) - f(a)}{b - a}$



$$y = f(c) + f'(c)(x - c)$$

DIFF.
LASKENNAN
VÄLIARVOLAUSE

RATK.



• SELKEÄ, JOS ON YKSI RATKAISU

IDEOITA ~~VOI OLLA USEAMPI~~

FUNKTIO VOI OLLA

$$f(x) = kx + d(x-a)(b-x), \quad \begin{matrix} k \text{ JA} \\ d \text{ VAKIOITA} \end{matrix}$$

• JOS HALUAA USEAMMAN RATKAISUN, NIIN ESIM,

$$f(x) = kx + \underbrace{\sin\left(n\pi \varphi\left(\frac{x-a}{b-a}\right)\right)}_{= h(x)}, \quad \begin{matrix} \varphi: [0, 1] \rightarrow [0, 1] \\ \text{kasvava} \end{matrix}$$

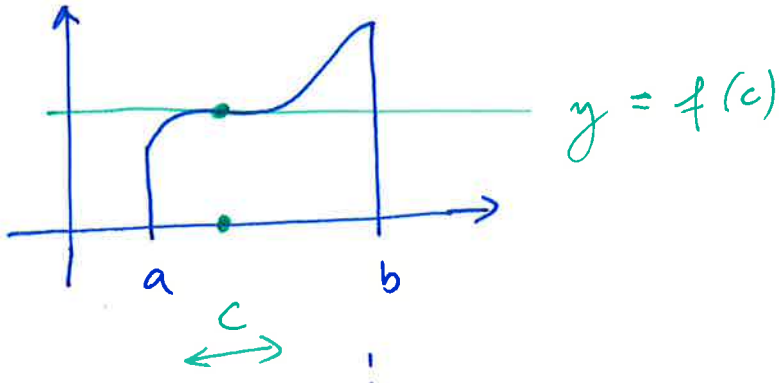
RATK c , JOLLE $f'(c) = 0$

② ETSI $c \in (a, b)$, JOLLE

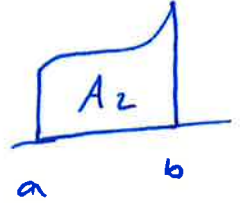
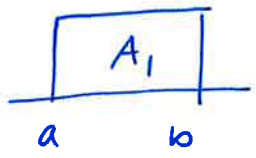
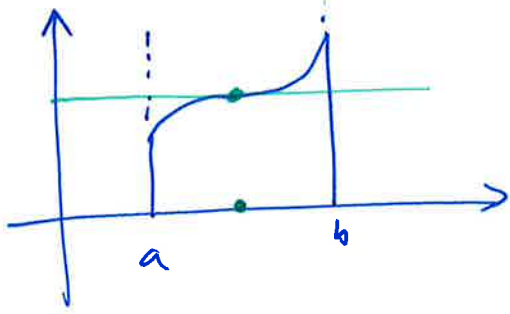
$$f(c)(b-a) = \int_a^b f(x) dx$$

INT, LASKENNAN
VÄLIARVOLAUSE

~~ESM~~

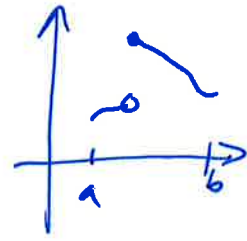
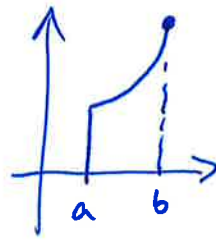
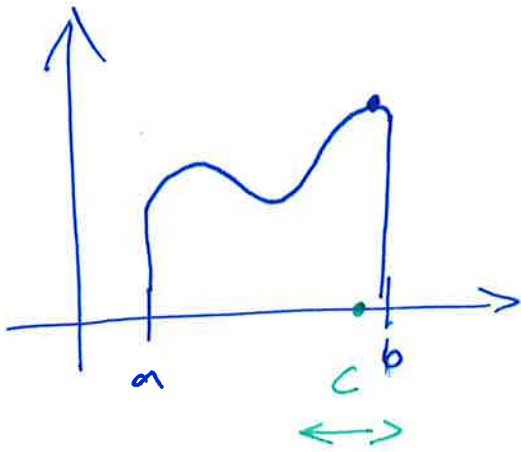


RATK.



$$A_1 = A_2$$

③ ETSI $c \in [a, b]$, JO LLE $f(c) = \max_{x \in [a, b]} f(x)$

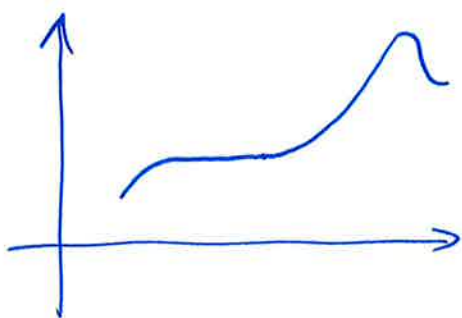


- VASTAAVASTI PIENIN ARVO

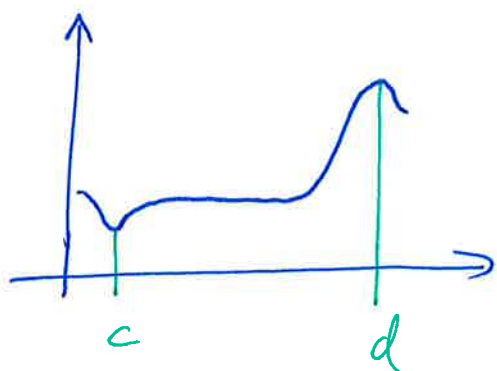
- VASTAAVASTI

ETSI $c \in [a, b]$, JO LLE $f'(c) = 0$

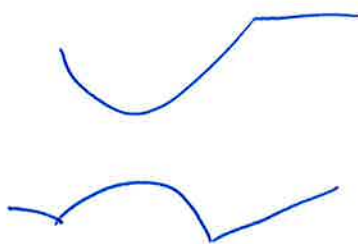
4) ETSI ~~MINIMIN~~ SUURIN VÄLI $[c, d]$, $c \in [a, b]$
 JOLLA f ON KASVAVA



RATK



- VAST. VÄHENEVÄ
- VAST. KONVEKSI
- VAST. KONKAAVI

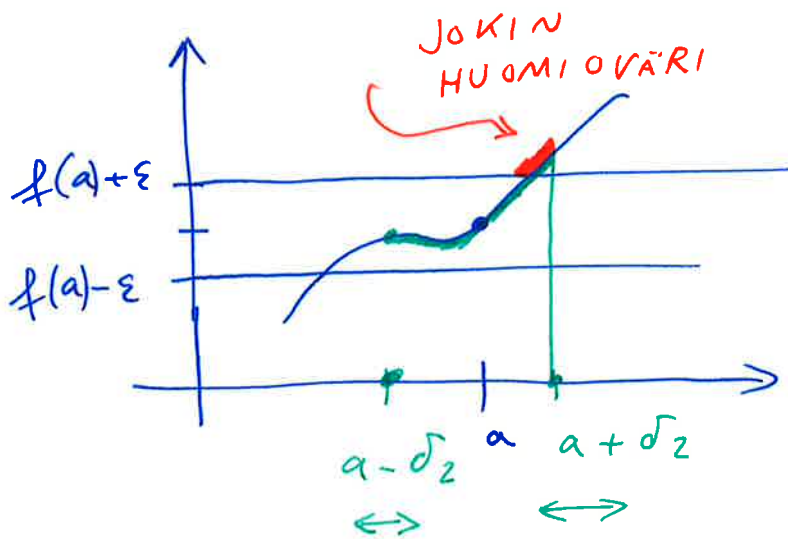


⑤ ETSI ~~JOKIN~~ JOKIN VÄLI

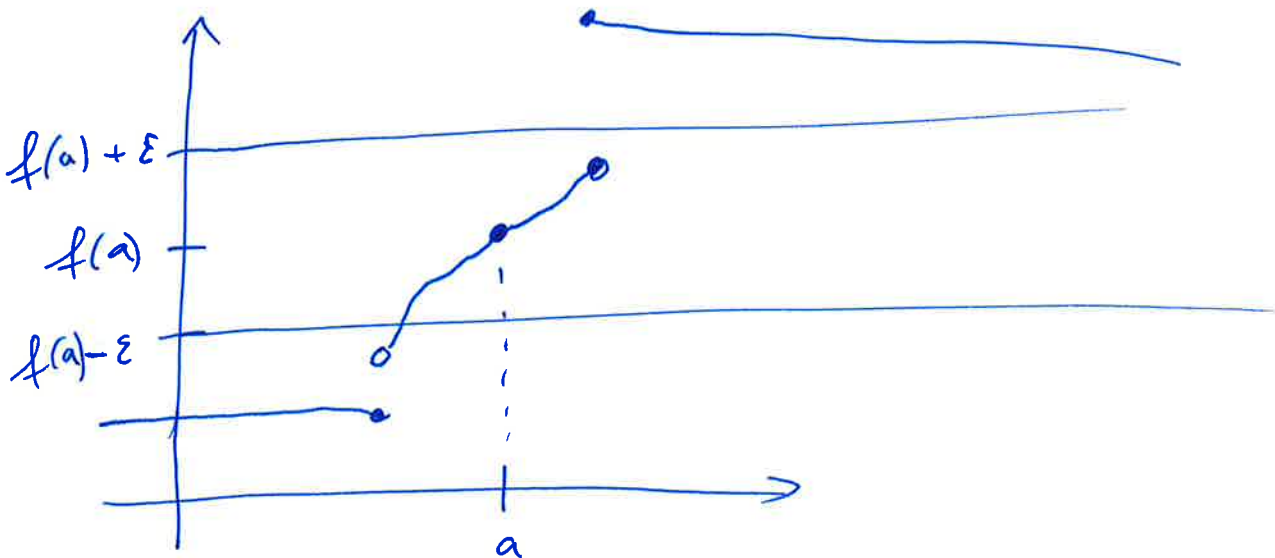
$$[a - \delta_1, a + \delta_2] \quad \text{SITEN, ETTÄ}$$

⊗ $|f(x) - f(a)| \leq \varepsilon$ KAIKILLA $x \in [a - \delta_1, a + \delta_2]$

$\left\{ \begin{array}{l} 0.1 \\ 1 \end{array} \right.$ ~~JOKIN~~ JOKIN LUKU



⑥ ETSI JOKIN $\varepsilon > 0$ JA JOKIN VÄLI
 $[a - \delta_1, a + \delta_2]$ SITEN, ETTÄ ⊗ TOSI



⑦ FTSI $c \in [a, b]$, JOLLE

$$f(c) = \alpha \quad \left[\begin{array}{l} \alpha \text{ JOKIN ANNETTU} \\ \text{ARVO} \end{array} \right]$$

$$\left[\min_{x \in [a, b]} f(x) < \alpha < \max_{x \in [a, b]} f(x) \right]$$

