Intro to numerical optimization. Gradient descent

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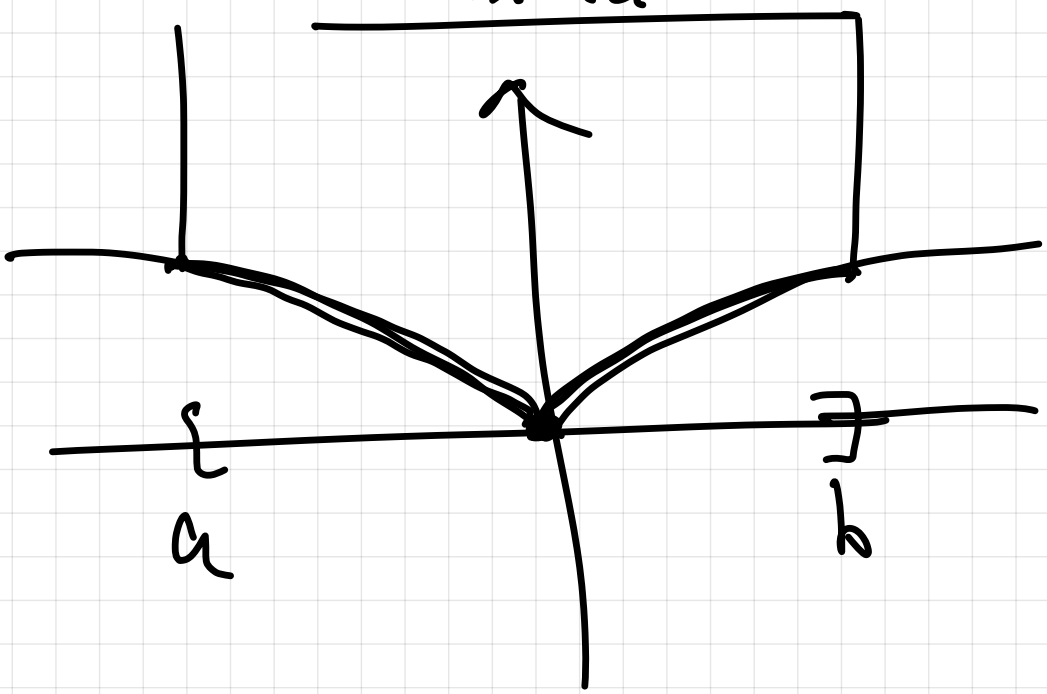
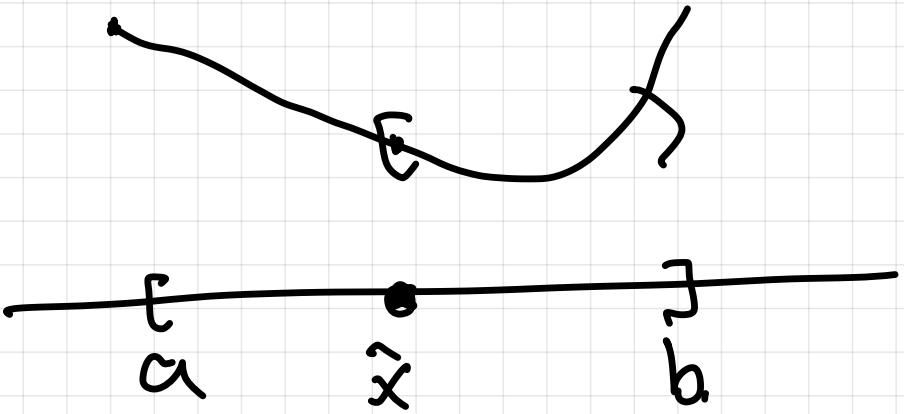
Seminar 7





$\min f(x)$

$f: [a;b] \to \mathbb{R}$

f is unimodal

$f(a)$ $f(b)$ $f(\hat{x})$

$a \le \hat{x} \le b$

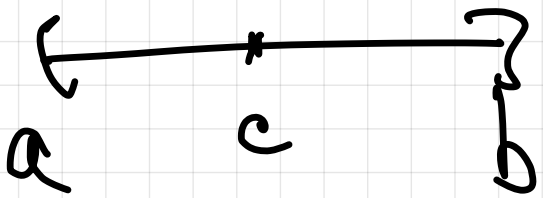
$\frac{a+b}{2}$

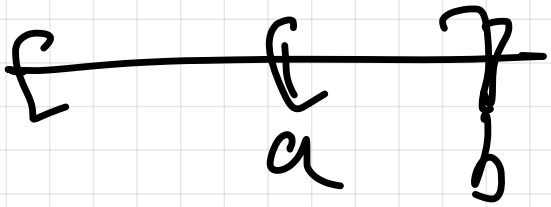
1) $f(\hat{x}) < f(a)$

$[a;b] \to [\hat{x}, b]$

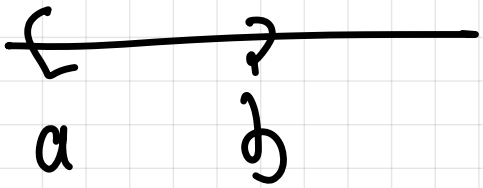
2) $f(\hat{x}) > f(a)$

1) $[a; b] \rightarrow$

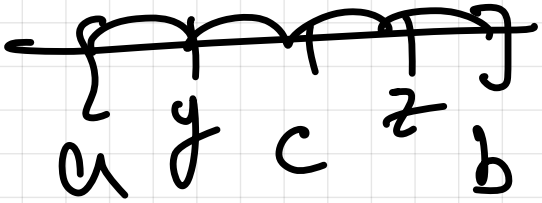


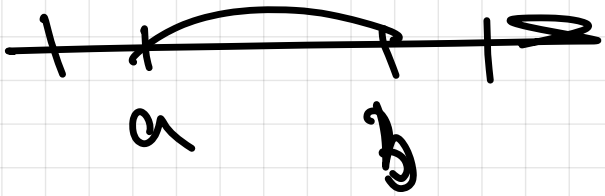


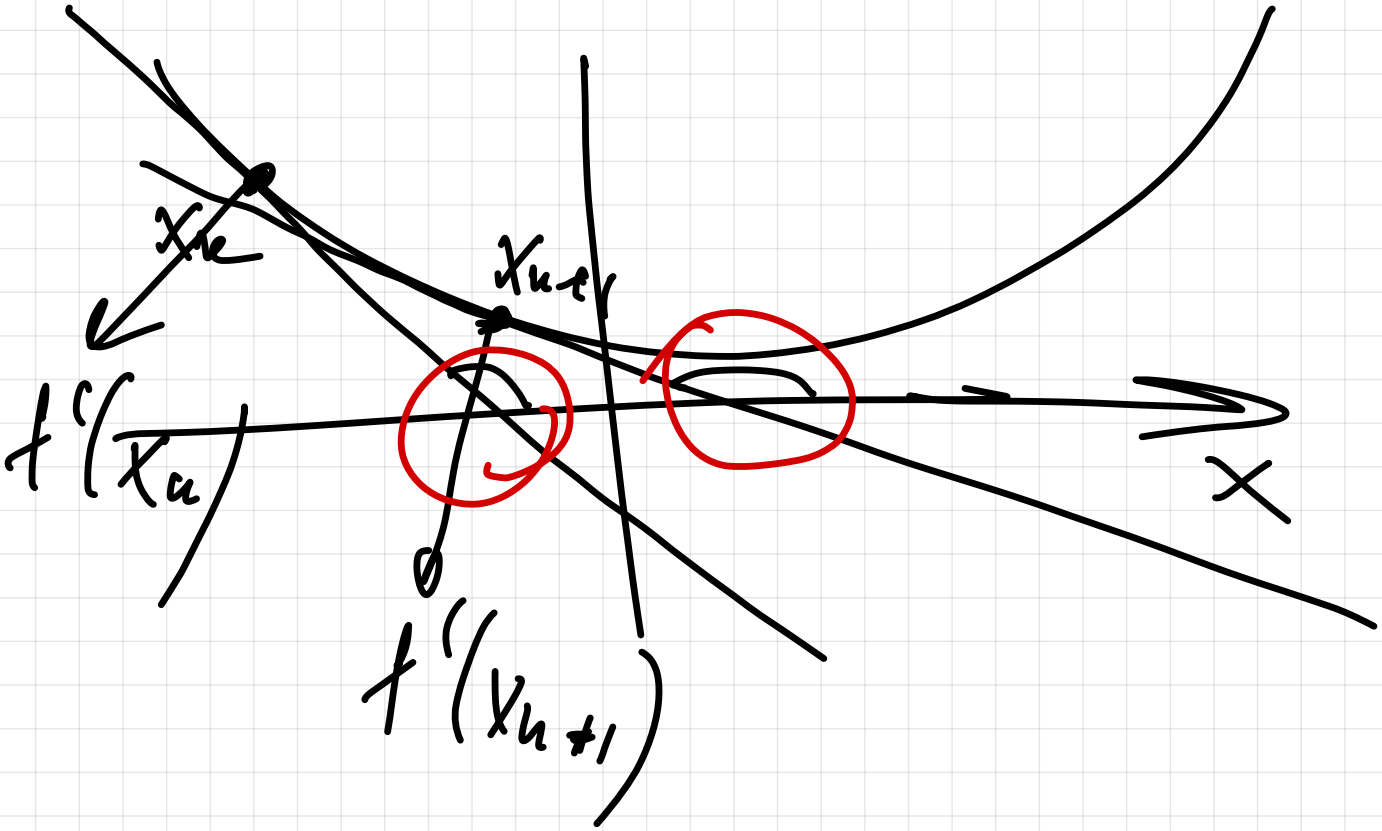
2) $[a; b \rightarrow$



3) $[a; b]$







$$\frac{1}{2} x^T A x - d^T x \qquad A \in S^n_{++}$$

$$\min_x$$

$$x_{k+1} = x_k - \alpha_k (Ax_k - b)$$

$$Ax^* = b$$

$$Ax_1 \stackrel{?}{=} b \; ?$$

$$x_{k+1} = x_k - \frac{1}{\|A\|_2} (Ax_k - b)$$

$$x_1 = x_0 - \frac{1}{\|A\|_2} (Ax_0 - b)$$