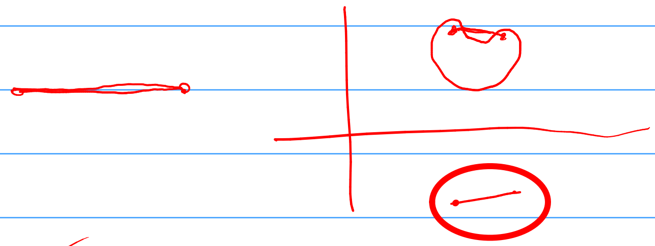
Convex Optimisation

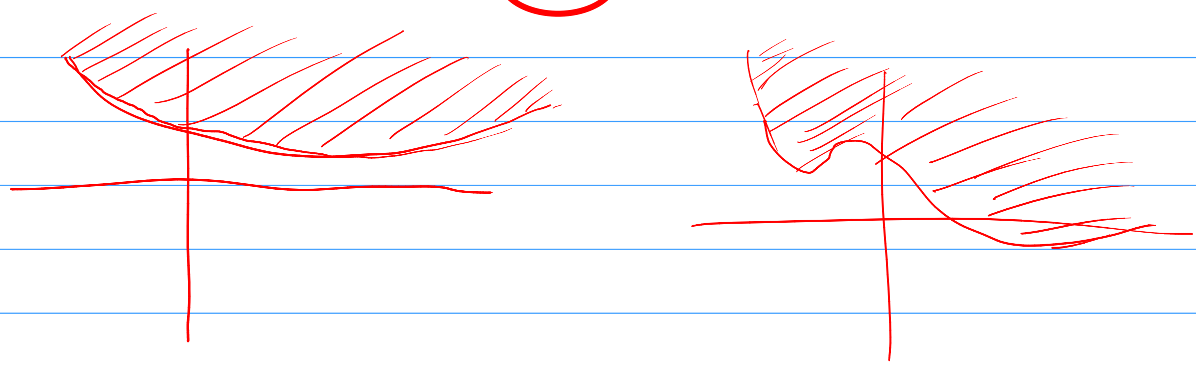
$\forall\, a, b \in S$

$\theta a + (1-\theta) b \in S$

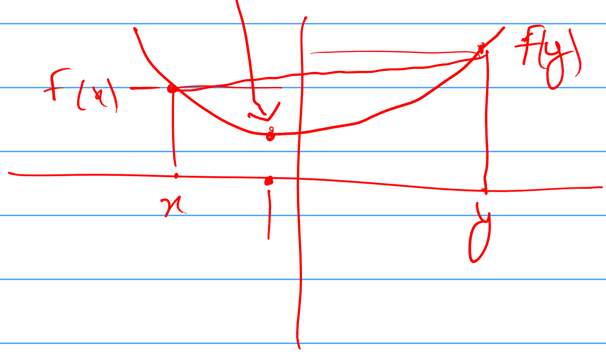
$a, b \in S$

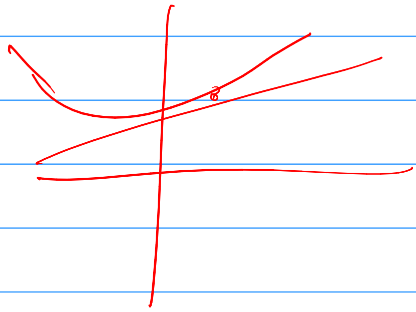
$\theta a + (1-\theta) b \in S \; ; \; \theta \in [0,1]$





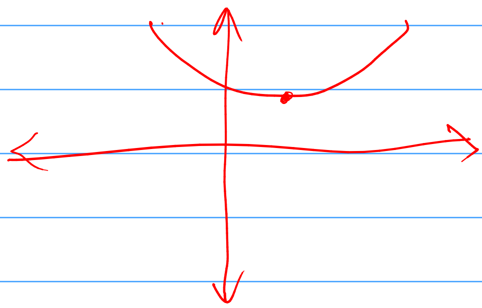
$$\underbrace{f(\theta x + (1-\theta) y)} \leq \theta f(x) + (1-\theta) f(y)$$

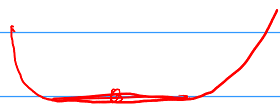


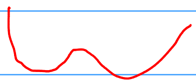


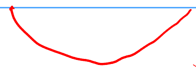
$$H_{ij} = \frac{\partial^2 f}{\partial x_i \partial x_j}$$

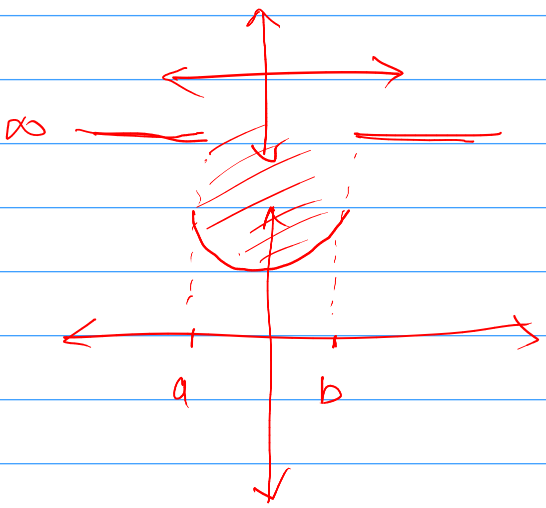
A, $\quad x^T A x \geq 0 \quad \forall x$

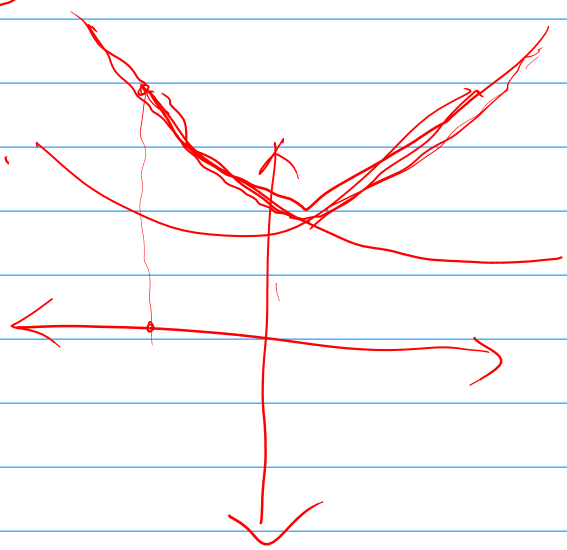








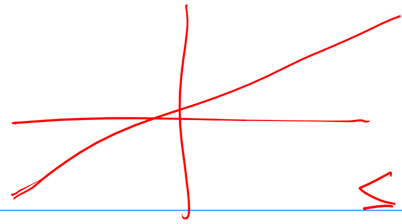




$\left[\quad\right]_5 \qquad k=3$

$x_1 + x_2 + x_3$

$\left[\quad\right]_1 \qquad x^T v$



$V \longrightarrow {}^5C_3$

$\begin{bmatrix}1\\1\\1\\0\\0\end{bmatrix}$ $\quad x^T v_i^*$

$$L(x,\lambda,\nu) = \underline{f_0(x)} + \sum_{i=1}^{m} \lambda_i \underbrace{f_i(x)}_{\text{ineq.}} + \sum_{i=1}^{p} \nu_i h_i(x)$$

$\lambda_i \geq 0$

$$f_i(x) - \lambda_i$$

$$g(\lambda,\nu) = \inf_{x\in D} L(x,\lambda,\nu)$$

$x^* \in D$

$g(\lambda,\nu) \leq p^* \qquad p^* = f_0(x^*)$

$$g(\lambda,\nu) = f_0(x^*) + \underbrace{\sum \lambda_i f_i(x^*)}_{\leq 0}$$

$$g(\lambda,\nu) \leq f_0(x^*) = p^*$$