

Hvis $f(x)$ er konvex og

$$\frac{\partial f}{\partial x}(x^*) = 0$$

Så er x^* et maksimumspunkt (3.1.2)

∑^o gælder, at

$$\begin{aligned} f(x^*) - \langle \lambda, g(x^*) - b \rangle \\ \geq f(x) - \langle \lambda, g(x) - b \rangle \end{aligned}$$

for alle tilladte x ,

$$\lambda = (\lambda_1, \dots, \lambda_m)'$$

$$g = (g_1, \dots, g_m)$$

$$\Rightarrow f(x^*) - f(x) \geq \langle \lambda, g(x^*) - g(x) \rangle$$

$$\text{U's : } \geq 0 \text{ for alle tilladte } x.$$

$$\begin{aligned} \langle \lambda, g(x^*) - g(x) \rangle \\ = \sum_{j=1}^m \lambda_j (g_j(x^*) - g_j(x)) \end{aligned}$$

$$\text{Tilfælde 1 : } g_j(x^*) < b_j$$

$$\Rightarrow \lambda_j = 0$$

$$\text{Tilfælde 2 : } g_j(x^*) = b_j$$

$$\begin{aligned} \Rightarrow \lambda_j (g_j(x^*) - g_j(x)) &= \lambda_j (b_j - g_j(x)) \\ &\geq 0 \end{aligned}$$

fordi x er tilladt, dvs.

$$\begin{aligned} b_j - g_j(x) &\geq 0 \\ \lambda_j &\geq 0. \end{aligned}$$

$$\Rightarrow f(x^*) - f(x) \geq 0$$

□