A
?
$\lambda_{min}(A)$
$\lambda_{max}(A)$
A
$\lambda_{min}(A) =$
$\min x^T Ax$
$s.t.||x||^2 =$
$1,$
$\lambda_{max}(A) =$
$\max x^T Ax$
$s.t.||x||^2 =$
$1,$
x^*
x^*
$A \in$
$R^{n \times n}$
$B \in$
$R^{n \times n}$
λ
(A, B)
$q \in$
$R^{n \times n}$
$Aq =$
λBq
q
λ
λ
(A, B)
λ
$det(A-$
$\lambda B) =$
0
(A, B)
$det(A-$
$\lambda B)$
λ
$det(A-$
$\lambda B) \neq$
0
(A, B)
(A, B)
$\lambda \in$
R
(A, B)
B
(A, B)
AB^{-1}
$B^{-1}A$
B
$P(\lambda) =$
$det(A-$
$\lambda B)$
n
r
$P(\lambda)$
(A, B)
$(n-$
$r)$
∞
$A =$
21
01
$B =$
10
01
$det(A-$
$\lambda B) =$
$2-$
λ
(A, B)
∞
$A =$
11
10
$B =$
10
00
$det(A-$
$\lambda B) =$
-1
(A, B)
∞
?
I
$f_i(x), i \in$
I
S
$f(x) =$
$\max_{i \in I} f_i(x)$
S
f
$-f$
I

$\min_{y\in I} f_y(x)$

$f_y(x) = y^T A_0 y + x_1 y^T A_1 y + \cdots + x_n y^T A_n y.$

$y \in$
I
$f_y(x)$
??
$f(x)$
S
R^n
f
S
ξ
f
$\bar{x} \in$
S
$f(x) \geq f(\bar{x}) + \xi^T (x - \bar{x}), \forall x \in S.$

f
S
ξ
f
$\bar{x} \in$
S

$f(x) \leq f(\bar{x}) + \xi^T (x - \bar{x}), \forall x \in S.$

f
$\bar{x}$
$\partial f(\bar{x})$
f
D
R^n
f
$\bar{x} \in$
$int(S)$
$\nabla f(\bar{x})$
$\alpha :$
$R^n \to$
R
$x \in$
S
$f(x) = f(\bar{x}) + \nabla f(\bar{x})^T (x - \bar{x}) + ||x - \bar{x}|| \alpha(\bar{x}, x - \bar{x}),$

$\lim_{x\to\bar{x}} \alpha(\bar{x}, x -$
$\bar{x}) =$
0
$\nabla f(\bar{x})$
f
$\bar{x}$
?
S
R^n
f
S
f
$\bar{x} \in$
$int(S)$
f
$\bar{x}$
$\partial f(\bar{x})$
$\{\nabla f(\bar{x})\}$
?
I
$f_i(x),\ i \in$
I
S
$f(x) =$
$\max_{i\in I} f_i(x)$
f
$\bar{x}$
$\partial f(\bar{x})$

$$\partial f(\bar{x}) = Conv\left(\bigcup_{i\in T} \partial f_i(\bar{x})\right),$$

$T =$
$\{i \in$
$I | f_i(\bar{x}) =$
$f(\bar{x})\}$
$f(x) =$
$\lambda_{min}(A(x))$
$A(x) =$
$A_0 +$
$x_1 A_1 +$
$\cdots +$
$x_n A_n$
$i =$
$1, ..., n$
$A_i \in$
$R^{m\times m}$
$\partial f(\bar{x})$