

The background of the slide is a faded image of the Jiaotong University gate. The gate is a large, white, curved structure with the university's name in English, "JIAOTONG UNIVERSITY", on the right side and in Chinese, "交通大学", on the left side. The gate is flanked by trees and a building with a red roof. A large, dark purple rectangular box is superimposed over the center of the image, containing the text "作业8" in yellow.

## 作业8

2021-2022学年第2学期

## 作业8

1. 讨论如下约束条件:

$$(x_1 - 1)^2 + x_2^2 \leq 1; x_2^2 - x_1 + 1 \leq 0$$

确定的可行域在 $(1, 1)^T$ 处的可行方向集, 序列可行方向集, 以及线性化可行方向集。

2. (教材182页, 习题第4题) 证明: 若 $\{\mathbf{a}_i(\mathbf{x}^*), i \in \mathcal{A}^*\}$ 线性无关, 则:  $\mathcal{F}_S^* = \mathcal{F}_L^*$ , 即在 $\mathbf{x}^*$ 处序列可行方向集与线性化可行方向集相等。
3. 考虑约束优化问题:

$$\begin{aligned} \min & -x_1 \\ \text{s.t.} & 1 - x_1^2 - x_2^2 \geq 0; x_2 - (x_1 - 1)^2 \geq 0. \end{aligned}$$

试证明:  $(1, 0)^T$ 是KKT点, 而 $(0, -1)^T$ 不是KKT点。

4. (教材183页, 习题第10题(2))求如下问题的KKT点, 并判断这些KKT点是否为最优解:

$$\begin{aligned} \min \quad & (x_1 + x_2)^2 + 2x_1 + x_2^2 \\ \text{s.t.} \quad & x_1 + 3x_2 \leq 4; \quad 2x_1 + 2x_2 \leq 3; \\ & x_1 \geq 0; x_2 \geq 0. \end{aligned}$$