Assignment 2: Constrained Optimization and the KKT Conditions

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KKT Conditions for Linear Programming

A linear program can be expressed in canonical form as:

$$\min_x c^T x \qquad \text{subject to} \qquad Ax \leq b$$

for matrices $A \in \mathbb{R}^{m \times n}, b \in \mathbb{R}^{m \times 1}$ and $c \in \mathbb{R}^{n \times 1}$.
The Lagrangian would be

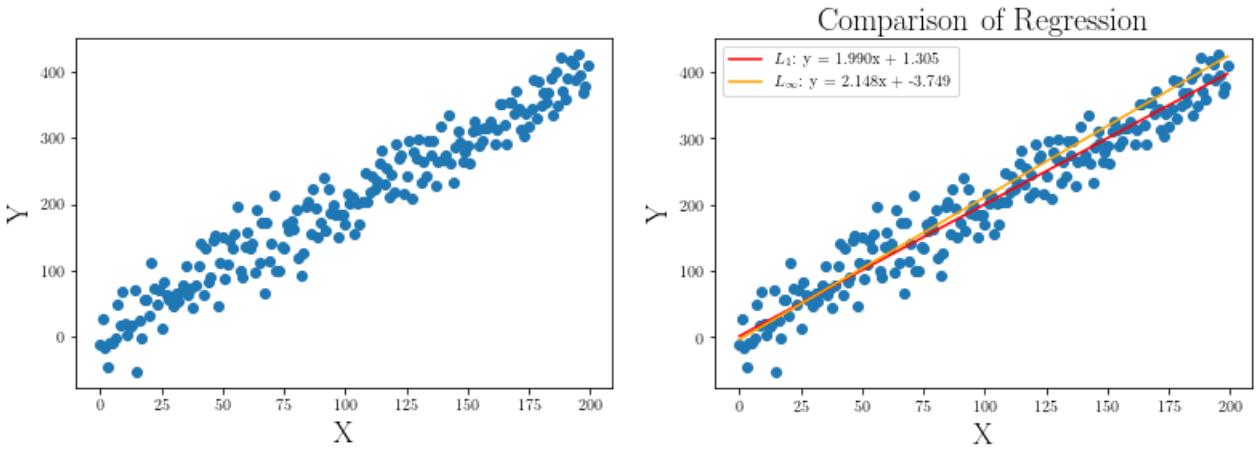
$$\mathcal{L}(x, \lambda) = c^T x - \lambda(Ax - b)$$

In this case, λ is a vector of n values. Primal feasibility, dual feasibility, complementary slackness, and lagrange stationarity

Expressing l_1 and l_∞ Regression Problems as Linear Programs

Specifically, by defining slack variables and inequality constraints as needed.

Solving l_1 and l_∞ regression problems using CVXPY



Graph.png

Figure 1: The contour plots, as well as the 3D projection plot indicates that there is a unique maximum over the domain. This is critical point is approximately $x^* \approx [1\text{m}, 1\text{ rad}]$.