Some examples of solving nonlinear programming problems with CAS

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We would like to present some examples of solving nonlinear programming problems using Mathematica and wxMaxima. It's a didactic proposal to support teaching students nonlinear programming (NLP) using CAS. Elements of NLP are taught in the framework of such university courses as for example: mathematical analysis, mathematical programming, operation researches or optimization methods. In the framework of this talk we will present graphical method (dynamic plots) for solving integer NLP, NLP problems, several examples for Karush-Kuhn-Tucker conditions and two examples for convex optimization. We will consider NLP problems in the following form:

$$\begin{aligned} \underset{(x_1,x_2,\ldots x_n)}{\text{maximize}} \quad & f(x_1,x_2,\ldots,x_n) \\ \text{subject to:} \quad & g_i(x_1,x_2,\ldots,x_n) \geq 0,\ i=1,2,\ldots m, \\ & (x_1,x_2,\ldots,x_n) \in X, \end{aligned}$$

where n and m are positive integers, X is a subset of $\mathbb{R}^n$ and f, g_i are real-valued functions on X with at least one function of f, g_i $(i = 1,2,\ldots,m)$ being nonlinear.

References

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