

INSTITUTO TECNOLÓGICO DE AERONÁUTICA

MP-288 - Exercises on Numerical Line Search

Prof.: Rafael T. L. Ferreira

1) Consider the function $f(\mathbf{x}) = f(x_1, x_2) = 3(x_1 - 2)^2 + 3(x_2 - 3)^2 - 6x_1$. Find the minimum point of $f(\mathbf{x})$ along the direction $\mathbf{d}^0 = \{0.75, 0.5\}$ starting from the point $\mathbf{x}^0 = \{1.20, 1.50\}$.

Use line search methods with constant step function sampling, as proposed in the slides, with Phase I and both the Phase II there shown.

Use the golden section method.

The solution uncertainty required for all the methods is $I = 2 \times 10^{-4}$. Choose your favourite software for iterations visualization. Compare methods for the same initial search step δ .

2) Implement a Matlab routine called `golden_section.m`.

Define it as `[ao]=golden_section(f,xk,dk,delta,unc)`.

In other words, define a routine in which the inputs are the function `f`, the initial point `xk`, the current direction `dk`, the first search step `delta` and the final uncertainty `unc`; the output is `ao`, the optimum α^* parameter.