⊞ Viacheslav Draghilev's method

⊟ Jean example

$$\begin{bmatrix} a & b & c \end{bmatrix} := \begin{bmatrix} 2 & \sqrt{5} & 5 \end{bmatrix}$$

Minimize $\Phi := x^2 + y^2 + z^2$ subject to $\begin{cases} \varphi := \dfrac{x^2}{a^2} + \dfrac{y^2}{b^2} + \dfrac{z^2}{c^2} - 1 \\ \Psi := x + y - z \end{cases}$

"Lagrangian" $L := \Phi + \lambda \cdot \varphi + \mu \cdot \Psi$

$$\begin{cases} fx := \dfrac{d}{d\,x} L \\ fy := \dfrac{d}{d\,y} L \\ fz := \dfrac{d}{d\,z} L \\ f\lambda := \dfrac{d}{d\,\lambda} L \\ f\mu := \dfrac{d}{d\,\mu} L \end{cases} = \begin{cases} \dfrac{x \cdot (4 + \lambda) + 2 \cdot \mu}{2} \\ \dfrac{2 \cdot y \cdot (5 + \lambda) + 5 \cdot \mu}{5} \\ \dfrac{2 \cdot z \cdot (25 + \lambda) - 25 \cdot \mu}{25} \\ \dfrac{5 \cdot \left(5 \cdot \left(-4 + x^2\right) + 4 \cdot y^2\right) + 4 \cdot z^2}{100} \\ x + y - z \end{cases}$$

$$F(X) := \left\| \begin{array}{l} \begin{bmatrix} x := X_1 & y := X_2 & z := X_3 & \lambda := X_4 & \mu := X_5 \end{bmatrix} \\ \begin{bmatrix} fx & fy & fz & f\lambda & f\mu \end{bmatrix}^T \end{array} \right.$$

$$Xo := \text{roots}\left(F(X), \begin{bmatrix} X_1 \\ X_2 \\ X_3 \\ X_4 \\ X_5 \end{bmatrix}, \begin{bmatrix} 2 \\ -1 \\ 0 \\ -4 \\ 1 \end{bmatrix} \right) = \begin{bmatrix} 1.5738 \\ -1.3771 \\ 0.1967 \\ -4.4118 \\ 0.324 \end{bmatrix}$$

$t_{max} := 4$ $\begin{bmatrix} U & Roots \end{bmatrix} := Draghilev\left(F(X), Xo, 0, t_{max}, 10, 10^{-3} \right)$ $\text{rows}(U) = 11$

$$Roots = \begin{bmatrix} 1.5738 & -1.3771 & 0.1967 & -4.4118 & 0.324 \end{bmatrix}$$