

II.2 Systems of nonlinear equations

Problem: Given an n -dimensional real and continuous function $\vec{f}: D \subset \mathbb{R}^n \rightarrow \mathbb{R}^n$, solve

$$\vec{f}(\vec{x}) = 0$$

Short notation for system of nonlinear equations:

$$\left. \begin{array}{l} f_1(x_1, \dots, x_n) = 0 \\ f_2(x_1, \dots, x_n) = 0 \\ \vdots \\ f_n(x_1, \dots, x_n) = 0 \end{array} \right\} \vec{f}(\vec{x}) = 0$$

Ex.: (3) $n=2$, $D = [0, 2]^2 \subset \mathbb{R}^2$

$$f_1(x_1, x_2) = x_1^2 + x_2 - 2 = 0$$

$$f_2(x_1, x_2) = x_2 \cdot e^{x_1} - 2 = 0$$

~ contour / level curves (slides)