

N.1

$$\rho_a \approx |f'(x_1, x_2)| \quad x_1 = 1 \quad x_2 = 10^{-4}$$

$$f' = J_f = \begin{pmatrix} \frac{\partial f}{\partial x_1} & \frac{\partial f}{\partial x_2} \end{pmatrix} = \begin{pmatrix} \frac{1}{x_1} & -\frac{x_1}{x_2^2} \end{pmatrix}$$

$$\rho_a \approx \left\| \begin{pmatrix} \frac{1}{10^{-4}} & -\frac{1}{10^{-8}} \end{pmatrix} \right\| = \|(10^4 \quad -10^8)\|$$
$$= 10^4 + 10^8$$