$$\boldsymbol{y} \in \mathbb{R}^m, \boldsymbol{y}(t), \boldsymbol{y}\colon \mathbb{R} \to \mathbb{R}^m, \boldsymbol{y}' = \boldsymbol{f}(\boldsymbol{y})$$

$$\boldsymbol{f}(\boldsymbol{y}) = \boldsymbol{f}(\boldsymbol{y}_0) + \frac{\partial \boldsymbol{f}}{\partial \boldsymbol{y}}(\boldsymbol{y}_0)(\boldsymbol{y} - \boldsymbol{y}_0) + \cdots + \cong \boldsymbol{A}\boldsymbol{y}$$

$$\boldsymbol{y}' = \boldsymbol{A}\boldsymbol{y}, \boldsymbol{y}(0) = \boldsymbol{y}_{\text{init}} \Rightarrow \boldsymbol{y}(t) = \exp(\boldsymbol{A}t)\, \boldsymbol{y}_{\text{init}}$$

$$e^{\boldsymbol{A}t} = \boldsymbol{I} + \frac{1}{1!}\boldsymbol{A}t + \ldots + \frac{1}{n!}\boldsymbol{A}^n t^n + \cdots +$$

$$\boldsymbol{A}\boldsymbol{X} = \boldsymbol{X}\boldsymbol{\Lambda}, \exists \boldsymbol{X}^{-1} \Rightarrow \boldsymbol{A} = \boldsymbol{X}\boldsymbol{\Lambda}\boldsymbol{X}^{-1}, \boldsymbol{A}^n = \boldsymbol{X}\boldsymbol{\Lambda}^n\boldsymbol{X}^{-1}$$

$$e^{\boldsymbol{A}t} = \boldsymbol{X} e^{\boldsymbol{\Lambda}t}\boldsymbol{X}^{-1} = \boldsymbol{X}\,\operatorname{diag}(e^{\lambda_1 t}, \ldots, e^{\lambda_m t})\,\boldsymbol{X}^{-1}$$