

## Diagonalization

For the idea of what diagonalization is and why it might be helpful, let's look at an example.

**Example.** Find the general solution of the system

$$\vec{x}' = \begin{bmatrix} 2 & 0 \\ 0 & 3 \end{bmatrix} \vec{x} + \begin{bmatrix} t \\ e^{-t} \end{bmatrix}.$$

So, if the matrix is diagonal, then the system is *decoupled*, and it becomes a collection of individual equations that we can solve. The question is, can we convert a system that is not diagonal into one that is?

How does this solve the problem?