

# ① Homework 6 [50 pts]

ODE Fall 2012

PROF. ALEKSANDAR DONEV

① Solve the system of ODEs  
[10pts]

$$\begin{cases} y_1' = 5y_1 - 2y_2 + e^t \\ y_2' = 4y_1 - y_2 \end{cases}$$

where  $y_1(t)$  and  $y_2(t)$  are the unknowns, and the initial condition is

$$y_1(0) = 1 \quad y_2(0) = 0$$

② Find a fundamental solution matrix  $\Phi$  for a system  
[10pts] of linear ODEs

$$y' = Ay, \quad y \in \mathbb{R}^3$$

where

$$A = \begin{bmatrix} 3 & 1 & 0 \\ 0 & 3 & 1 \\ 0 & 0 & 3 \end{bmatrix}$$

②

## Homework 6, ODE Fall 2012

③ Solve the linear system

$$[15 \text{ pts}] \quad y' = Ay$$

where  $A = \begin{bmatrix} 2 & -3 \\ 3 & -4 \end{bmatrix}$

and initial condition

$$y(0) = \begin{bmatrix} 3 \\ 3 \end{bmatrix}$$

④

Solve the linear

[15 pts] system  $y' = Ay$  with

$$A = \begin{bmatrix} 3 & 5 \\ -5 & 3 \end{bmatrix}$$

with initial conditions

$$y(0) = \begin{bmatrix} 0 \\ 1 \end{bmatrix}$$