



Take Home Exam 10
System of ODEs

- Q1.** (*First Order Matrix ODE*) Put the following second order linear ODE into a first order matrix ODE. Determine the general solution.

$$y'' + 6y' + 8y = 0$$

- Q2.** (*First Order Matrix ODE with initial values*) Put the following second order linear ODE into a first order matrix ODE. Determine the solution.

$$y'' + 2y' + 2y = 0, \quad y(0) = 1, \quad y'(0) = 0$$

- Q3.** (*First Order Matrix ODE*) Express the following equations as first order linear matrix ODE and solve.

$$y_1' = 3y_1 + y_2$$

$$y_2' = y_1 + y_2$$

- Q4.** (*First Order Matrix ODE*) Express the following equations as first order linear matrix ODE.

$$y_1' = y_2$$

$$y_2' = -y_1 + y_3$$

$$y_3' = -y_2$$

- Q5.** (*First Order Matrix ODE*) Express the following equations as first order linear matrix ODE. Solve the initial value problem.

$$y_1' = 2y_2 + 2y_2$$

$$y_2' = 3y_1 - 2y_2$$

$$y_1(0) = 12, y_2(0) = 4$$