2E2 Tutorial Sheet 12 Second Term[1]

27 January 2004

1. (2) Last week the last question was to find the solution of

$$\frac{dy_1}{dt} = -y_1 - 2y_2 \tag{1}$$
$$\frac{dy_2}{dt} = 2y_1 - y_2 \tag{2}$$

   and put it in real form. The answer was

$$\mathbf{y} = \begin{pmatrix} r\cos 2t \\ r\sin 2t \end{pmatrix} e^{-t} \tag{3}$$

   Plot the phase plane diagram for this.

2. (3) Find the general solution for the system

$$\frac{dy_1}{dt} = 3y_1 + y_2 \tag{4}$$
$$\frac{dy_2}{dt} = -y_1 + y_2 \tag{5}$$

3. (3) Find the solution for the system

$$\begin{aligned} y_1' &= 4y_1 + y_2 \\ y_2' &= -y_1 + 2y_2. \end{aligned}$$

   with initial conditions $y_1(0) = 3$ and $y_2(0) = 2$.

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