2E2 Tutorial Sheet 12 Second Term¹

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

$$y_1' = 4y_1 + y_2 y_2' = -y_1 + 2y_2.$$

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

¹Conor Houghton, houghton@maths.tcd.ie and http://www.maths.tcd.ie/~houghton/ 2E2.html