Introduction to Differential Equations – Math 286 X1
Fall 2009
Homework 8 — due October 28

1. Solve

$$\mathbf{x}' = \begin{pmatrix} -1 & 1 \\ -4 & -1 \end{pmatrix} \mathbf{x}, \quad \mathbf{x}(0) = \begin{pmatrix} 1 \\ 1 \end{pmatrix}.$$

2. Solve

$$\mathbf{x}' = \begin{pmatrix} 3 & 1 \\ 0 & 3 \end{pmatrix} \mathbf{x}, \quad \mathbf{x}(0) = \begin{pmatrix} 1 \\ 1 \end{pmatrix}.$$

3. Solve

$$\mathbf{x}' = \begin{pmatrix} 3 & 1 \\ 0 & 2 \end{pmatrix} \mathbf{x}, \quad \mathbf{x}(0) = \begin{pmatrix} 1 \\ 1 \end{pmatrix}.$$

4. For each of these matrices A, compute e^{tA}:

$$A = \begin{pmatrix} 2 & 0 \\ 0 & 2 \end{pmatrix}, \quad A = \begin{pmatrix} 2 & 0 \\ 0 & -1 \end{pmatrix}, \quad A = \begin{pmatrix} 7 & -4 \\ 8 & -5 \end{pmatrix}.$$