

HOMEWORK ASSIGNMENT 5

(Due Thursday February 14, 2008 in class)

- (1) In the following, y_1 is a solution to the corresponding differential equation. Find the general solution.
- (a) $(2x + 1)y'' + 4xy' = 4y = 0$, $y_1 = x$,
 - (b) $xy'' - (2x + 1)y' + (x + 1)y = 0$, $y_1 = e^x$,
 - (c) $(e^x + 1)y'' - 2y' - e^xy = 0$, $y_1 = e^x/x$,
 - (d) $y'' + 4xy' + (4x^2 + 2)y = 0$, $y_1 = e^{ax^2}$
- (2) Find two *non-zero* 2×2 matrices A and B , such that $A \cdot B$ is the zero matrix.
- (3) Show that there are no such 2×2 matrices A and B , such that $AB - BA = I$, where I is the identity matrix.
- (4) Compute A^{10} for the following matrices:
- (a) $A = \begin{pmatrix} -9 & 4 \\ -33 & 14 \end{pmatrix}$,
 - (b) $A = \begin{pmatrix} 1 & -2 \\ 3 & -4 \end{pmatrix}$,
 - (c) $A = \begin{pmatrix} 2 & -1 \\ -3 & 4 \end{pmatrix}$
- (5) The sequence of numbers x_n is given by a recursive relation $x_n = 3x_{n-1} - 2x_{n-2}$, and initial conditions $x_1 = 5$, $x_2 = 7$. Find x_{25} .