Linear Algebra MATH 325: Assignment 6

(Due in class, March 15)

Problem 1: Find a square root of the matrix:

$$A = \begin{pmatrix} 3 & 1 \\ -1 & 1 \end{pmatrix}.$$

Problem 2: Find $\exp(A)$ where

$$A = \begin{pmatrix} 1 & -1 \\ 2 & 4 \end{pmatrix}.$$

Problem 3: Give a Jordan basis and the Jordan normal form for the following complex 4×4-matrix:

$$A = \begin{pmatrix} 3 & 1 & 0 & 1 \\ -1 & 1 & 2 & 0 \\ 0 & 0 & 6 & 4 \\ 0 & 0 & -4 & -2 \end{pmatrix}.$$

Hint: the matrix A is block triangular, hence its characteristic polynomial is equal to the product of the characteristic polynomials of $\begin{pmatrix} 3 & 1 \\ -1 & 1 \end{pmatrix}$ and $\begin{pmatrix} 6 & 4 \\ -4 & -2 \end{pmatrix}$.