

MATH 130A, WINTER 2009. MIDTERM 2.

Problem 1 (50%). Let $A = \begin{pmatrix} 0 & 2 & -2 \\ -1 & 2 & -1 \\ 0 & 0 & 1 \end{pmatrix}$, which has characteristic polynomial

$p(\lambda) = (1 - \lambda)(1 + (1 - \lambda)^2)$. Calculate the general solution to the equation $X' = AX$.

Problem 2 (50%). Let $A = \begin{pmatrix} 2 & -1 & 0 \\ 0 & 2 & -1 \\ -1 & 3 & -1 \end{pmatrix}$, which has the characteristic poly-

nomial $p(\lambda) = (1 - \lambda)^3$. Calculate the solution to the equation $X' = AX$ with

$$X(0) = \begin{pmatrix} 1 \\ 0 \\ 0 \end{pmatrix}.$$