

Homework 14 – this homework will not be graded

1. Let A be a matrix with $\det(A) = 2 + i$ and let P be an orthogonal matrix. What's the determinant of PAP^t ?
2. (a) Give an example of a normal NON-DIAGONAL 3×3 -matrix A with eigenvalues $\lambda_1 = 2$ and $\lambda_2 = 2 + i$ with algebraic multiplicities 2 and 1.
(b) Now let A be a normal 5×5 -matrix A with eigenvalues $\lambda_1 = -2$ and $\lambda_2 = 2 + i\sqrt{2}$ with algebraic multiplicities 2 and 3. What can you say about the Jordan form of A ?
3. Let A, B be orthogonal matrices. Show that AB and A^{-1} are orthogonal as well.
4. Let $A = \begin{pmatrix} 2 & -1 & 0 \\ -1 & 2 & -1 \\ 0 & -1 & 2 \end{pmatrix}$. The eigenvalues are $-2, 2 \pm \sqrt{2}$.
 - (a) Find the Jordan form of A , i.e. find a matrix Q such that $Q^{-1}AQ$ is in Jordan form.
 - (b) Apply the Gram-Schmidt algorithm to the columns of Q .
 - (c) Put the new vectors from the Gram-Schmidt algorithm into a matrix, call it P . Compute $P^{-1}AP$.
 - (d) Find the Schur form of A .
5. Determine whether $A = \begin{pmatrix} 1 & 2 \\ 0 & -i \end{pmatrix}$ is normal.
6. p. 330, problem 10.