MATH 307

Individual Homework 16

Instructions: Read textbook pages 147 to 148 before working on the homework problems. Show all steps to get full credits.

1. Compute eigenvalues and eigenvectors of matrix $\begin{pmatrix} -2 & -2 \\ -1 & -3 \end{pmatrix}$.
2. Suppose λ is an eigenvalue of an invertible matrix A corresponding to an eigenvector v, provide a set of eigenvalue and eigenvector for $(A^{-1})^3$. Note you may use the fact that the eigenvalues of an invertible matrix are nonzero.
3. A matrix P is called a projector if $P^2 = P$. Prove the eigenvalues of a projector are either 0 or 1.
4. Let A be a $m \times n$ matrix, prove that the eigenvalues of A^*A are real valued and non-negative.