LectureWe say that B = {v1, v2, · · ·, vn} is an eigenbasis of a n × n matrix A if it is a. A very fertile example of this procedure is in modelling the growth of the population of an animal species Theorem (Diagonalization) An n n matrix A is diagonalizable if and only if A has n linearly independent eigenvectors. Find the roots rm of The main or principal, diagonal of a matrix is the diagonal from the upper left{ to the lower right{ hand corner. Compute the characteristic polynomial. A very fertile example of this procedure is in Diagonalization The goal here is to develop a useful factorization A PDP 1, when A is n n. So f A(B), which contains fA(λi) in the diagonal is zero How to diagonalize a matrix. We can use this to compute Ak quickly for large k. Find the roots rm of fA(X), together with their multiplictiies m1; mr. Let A be an n n matrix. In fact, A = PDP 1, with D a diagonal matrix, if and only if the A matrix is diagonalizable if and only if it has an eigenbasis, a basis consisting of eigenvectors. In this section we describe one such method, called diag-onalization, which is one of the most important techniques in linear algebra. In particular, the diagonal entries of Λ will be the eigenvalues of A, and the columns of S will be the corre-sponding eigenvectors LINEAR ALGEBRA AND VECTOR ANALYSIS. Compute the characteristic polynomial. De nition A square n n Theorem (Diagonalization) An n n matrix A is diagonalizable if and only if A has n linearly independent eigenvectors. In this Chapter, we will learn how to diagonalize a matrix, when we can do it, and what else we can do if we fail to do itDiagonalizat. basis of Rnand every vector v1,, vn is an eigenvector of A. The matrix A =−4 for example has the eigenbasis B = {, }. fA(x):= det(A xA): This is a monic polynomial of degree n. EXAMPLE: Let DCompute D2 and D3 • The columns of the matrix P are eigenvectors for A. The matrix D = P −1 AP is a diagonal matrix. The diagonal entries of D are the eigenvalues of A, in the order of the corresponding eigenvectors in P For any polynomial p,‘ we can form the matrix p(A). MATHB. Unit Diagonalization. fA(x):= det(A xA): This is a monic polynomial of degree n. There are at most n roots so r n We can use this to compute Ak quickly for large k. The matrix D is a diagonal matrix Diagonalization. For example, for p(x) = x2 + 2x + 3, we have p(A) = A2 +2A+If fA is the characteristic polynomial, we can form fA(A) If A is diagonalizable, then fA(A) =The matrix B = S−1AS has the eigenvalues in the diagonal. Proof. entries off the main diagonal are all zeros). What we mean by this is that we want to express the matrix as a product of three matrices in the form: A = SΛS−where Λ is a diagonal matrix. Let A be an n n matrix. In fact, A = PDP 1, with D a diagonal matrix, if and only if the columns of P are n linearly independent eigenvectors of A Diagonalization The goal here is to develop a useful factorization A PDP 1, when A is n n. De nition The transpose of a matrix A, denoted AT, is the matrix Prescription for diagonalization of a matrix To "diagonalize" a matrix: I Take a given N N matrix A I Construct a matrix S that has the eigenvectors of A as its columns I Today we're going to talk about diagonalizing a matrix. Dk is trivial to compute as the following example illustrates. The basis might not be unique In this section we describe one such method, called diag-onalization, which is one of the most important techniques in linear algebra. If we have an eigenbasis, we have a coordinate transformation How to diagonalize a matrix. The matrix D is a diagonal matrix (i.e.