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1. Use the Gershgorin theorem to show that a symmetric, row diagonally dominant real matrix with positive diagonal elements is positive definite.

2. (JPE, May 1989) Let A be a real symmetric matrix, with eigenvalues λ_i , $1 \le i \le n$, satisfying

$$|\lambda_1| > |\lambda_2| \ge \cdots \ge |\lambda_n|$$

If x_1 is an eigenvector corresponding to λ_1 , and z_0 is a vector satisfying $z_0^t x_1 \neq 0$, prove that

$$\lim_{k \to \infty} \frac{z_0^t A^k z_0}{z_0^t A^{k-1} z_0} = \lambda_1$$

If you plan to take JPE this spring, see copies of some recent JPE tests at

http://www.math.uab.edu/programs/jpe_exams.html

Some older JPE tests are in the math office (ask Sue).