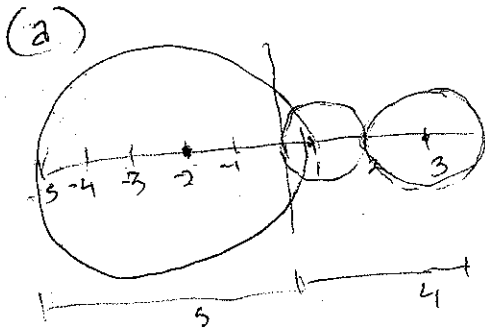


MATH 128B: QUIZ 3

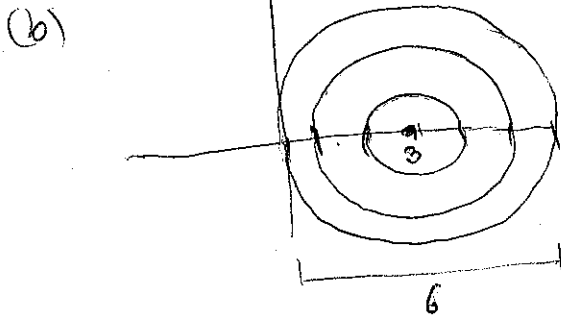
1. (Gershgorin Circle Theorem) For each of the following matrices  
 (i) draw the region in the complex plane which contains the eigenvalues  
 (ii) determine the spectral radius of each matrix.

(a)  $\begin{pmatrix} 1 & -1 & 0 \\ -2 & -2 & 1 \\ 0 & 1 & 3 \end{pmatrix}$



$\rho(A) \leq 5$

(b)  $\begin{pmatrix} 3 & 2 & 1 \\ 2 & 3 & 0 \\ 1 & 0 & 3 \end{pmatrix}$



$\rho(A) \leq 6$

Theorem (Gershgorin Circle)

Let  $A$  be an  $n \times n$  matrix. Let

$$R_i = \{ z \in \mathbb{C} \text{ st. } |z - a_{ii}| \leq \sum_{j=1, j \neq i}^n |a_{ij}| \}$$

then the evals of  $A$  lie inside  $R = \bigcup_{i=1}^n R_i$

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