

# 1 Compute Gershgorin Disks

Compute the Gershgorin disks of the following matrices and denote the matrices which necessarily have positive eigenvalues:

$$A = \begin{pmatrix} 14 & 10 & 8 \\ 10 & 14 & 8 \\ 8 & 8 & 6 \end{pmatrix}, \quad B = \begin{pmatrix} 10 & 1 & 5 \\ 1 & 17 & 5 \\ 5 & 5 & 25 \end{pmatrix}, \quad C = \begin{pmatrix} 5 & 1 & 3 \\ 1 & -2 & -3 \\ 3 & -3 & -6 \end{pmatrix}.$$

**Solution:**

- $a_{11} = 14, R_1 = 18$   
 $a_{22} = 14, R_2 = 18$   
 $a_{33} = 6, R_3 = 16$   
Based on Gershgorin discs we cannot say whether  $A$  is positive definite.
- $b_{11} = 10, R_1 = 6$   
 $b_{22} = 17, R_2 = 6$   
 $b_{33} = 25, R_3 = 10$   
 $A$  is positive definite.
- $c_{11} = 5, R_1 = 4$   
 $c_{22} = -2, R_2 = 4$   
 $c_{33} = -6, R_3 = 9$   
Based on Gershgorin discs we cannot say whether  $A$  is positive definite.