Chapter 10

10.1 QR Algorithm

\[ A^{(0)} = A \]

for \( k = 1, 2, \ldots \)

\[ Q^{(k)} R^{(k)} = A^{(k-1)} \]

\[ A^{(k)} = R^{(k)} Q^{(k)} = (Q^{(k)})^T A^{(k-1)} Q^{(k)} \]

10.2 With Shift

\[ (Q^{(0)})^T A^{(0)} Q^{(0)} = A \]

for \( k = 1, 2, \ldots \)

Pick shift \( \mu^{(k)} \), e.g. \( \mu^{(k)} = A^{(k-1)}_{m,m} \)

\[ Q^{(k)} R^{(k)} = A^{(k-1)} - \mu^{(k)} I \]

\[ A^{(k)} = R^{(k)} Q^{(k)} + \mu^{(k)} I = (Q^{(k)})^T A^{(k-1)} Q^{(k)} \]

If any \( A^{(k)}_{j,j+1} \) is "small", e.g. \(< 0(\epsilon) \| A \|\), set it to 0 and break the problem in 2.