## Chapter 10

### 10.1 QR Algorithm

```
A(0)}=
for k=1,2,\cdots
    Q (k)}\mp@subsup{R}{}{(k)}=\mp@subsup{A}{}{(k-1)
    A}\mp@subsup{}{(k)}{=}=\mp@subsup{R}{}{(k)}\mp@subsup{Q}{}{(k)}=(\mp@subsup{Q}{}{(k)}\mp@subsup{)}{}{T}\mp@subsup{A}{}{(k-1)}\mp@subsup{Q}{}{(k)
```


### 10.2 With Shift

$$
\begin{aligned}
& \left(Q^{(0)}\right)^{T} A^{(0)} Q^{(0)}=A \\
& \text { for } k=1,2, \cdots \\
& \text { Pick shift } \mu^{(k)} \text {, e.g. } \mu^{(k)}=A_{m m}^{(k-1)} \\
& Q^{(k)} R^{(k)}=A^{(k-1)}-\mu^{(k)} I \\
& A^{(k)}=R^{(k)} Q^{(k)}+\mu^{(k)} I=\left(Q^{(k)}\right)^{T} A^{(k-1)} Q^{(k)}
\end{aligned}
$$

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

