# RStudio: Linear Algebra

## Eigenvalues and Eigenvectors

Let $A$ be an $n \times n$ matrix, $I_n$ the identity $n \times n$ matrix and $\lambda I_n$ the diagonal with $\lambda$-scalar. Then $A - \lambda I_n$ is an $n \times n$ matrix and the determinant $|A - \lambda I_n|$ is a polynomial which we denote by $P_N(\lambda)$. $P_N(\lambda)$ is called the characteristic polynomial of $A$. The roots of $P_N(\lambda)$ are called eigenvalues of $A$.

**Example**

Find the eigenvalues of the matrix

$$A = \begin{pmatrix} 1 & 0 \\ 16 & 6 \end{pmatrix}.$$

First enter the matrix

```
A<-matrix(c(1,0,16,6),nrow=2,ncol=2,byrow=TRUE)
```

Then use the command

```
eigen(A,only.value=TRUE)
```

```
## $values
## [1] 6 1
##
## $vectors
## NULL
```

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