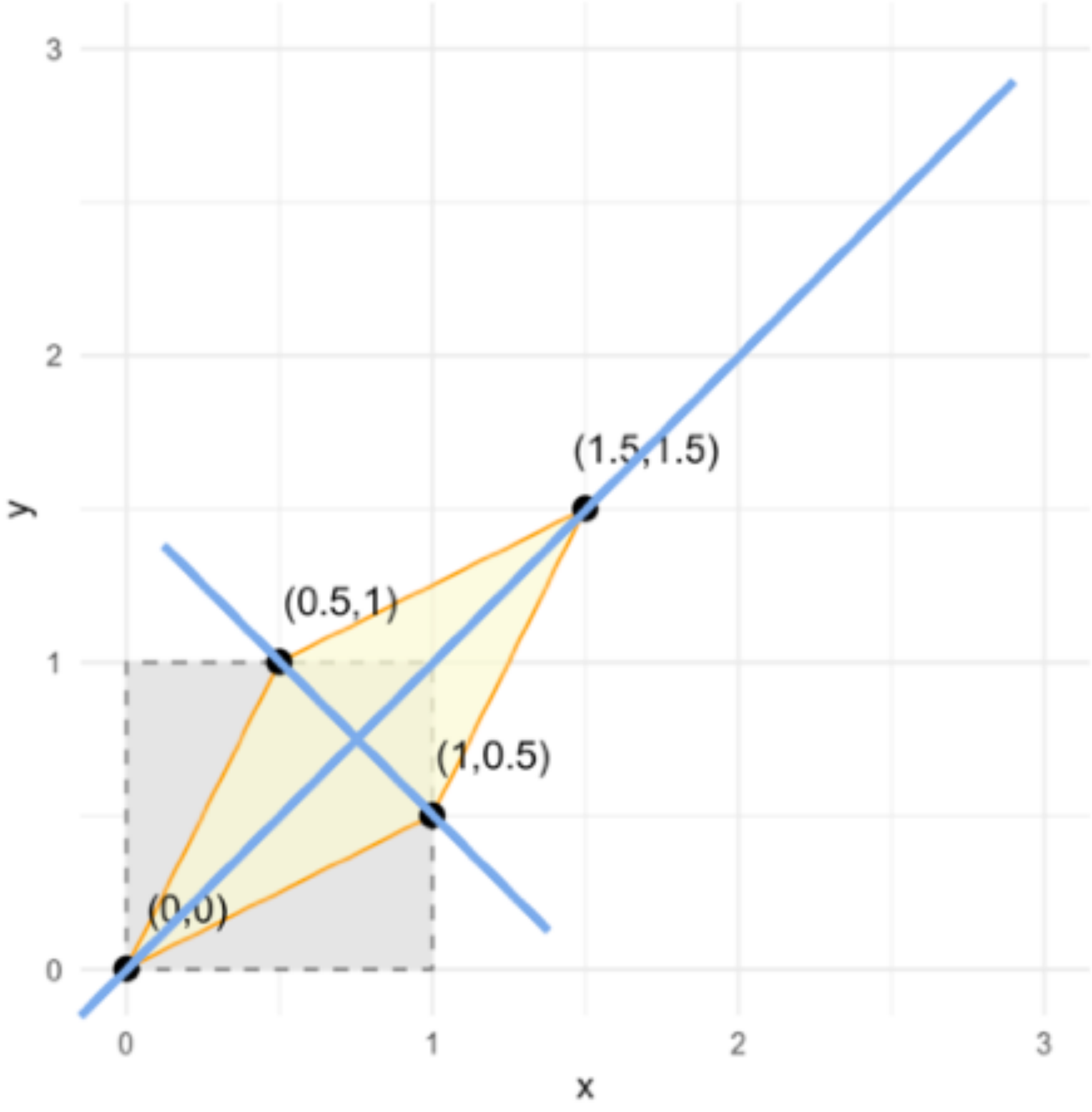
Eigendecomposition


(1.5,1.5)
(0.5,1)
(1,0.5)
(0,0)
y
x
0
1
2
3
0
1
2
3

$$\begin{bmatrix} 1 & 0.5 \\ 0.5 & 1 \end{bmatrix}$$

$$Ax = \lambda x$$

$$|A - \lambda I| = 0$$

to find the eigenvalues λ we can solve the so called **characteristic polynomial**

$$\begin{bmatrix} 1-\lambda & 0.5 \\ 0.5 & 1-\lambda \end{bmatrix}$$

$$\lambda I = \begin{bmatrix} \lambda & 0 \\ 0 & \lambda \end{bmatrix}$$

$$|A - \lambda I| = (1 - \lambda)(1 - \lambda) - (0.5)(0.5)$$

where

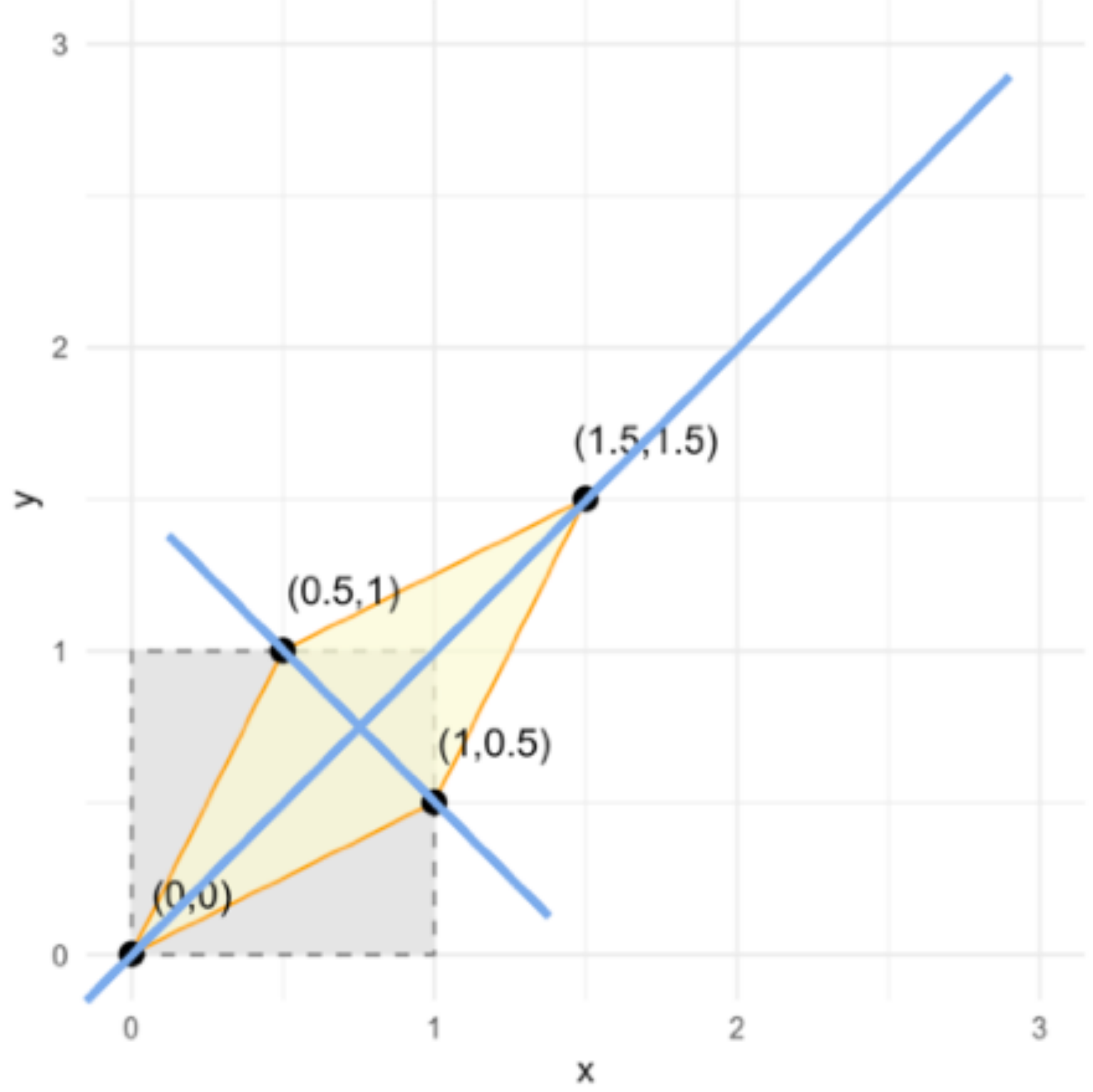
$$= \lambda^2 - 2\lambda + 0.75$$

solve the roots to get **eigenvalues**: $(\lambda - 1.5)(\lambda - 0.5) \implies \lambda = [1.5,\ 0.5]$

Eigendecomposition

$$\begin{bmatrix} 1 & 0.5 \\ 0.5 & 1 \end{bmatrix} \qquad Ax = \lambda x$$

to find the eigenvalues λ we can solve the so called **characteristic polynomial**



$$|A - \lambda I| = 0 \quad \text{where} \quad \lambda I = \begin{bmatrix} \lambda & 0 \\ 0 & \lambda \end{bmatrix}$$

$$\begin{bmatrix} 1-\lambda & 0.5 \\ 0.5 & 1-\lambda \end{bmatrix}$$

$$|A - \lambda I| = (1-\lambda)(1-\lambda) - (0.5)(0.5)$$

$$= \lambda^2 - 2\lambda + 0.75$$

solve the roots to get **eigenvalues**: $(\lambda - 1.5)(\lambda - 0.5) \implies \lambda = [1.5, 0.5]$

Eigendecomposition

plug eigenvalues back and get **eigenvectors** (direction)

$$\lambda = [1.5, 0.5]$$