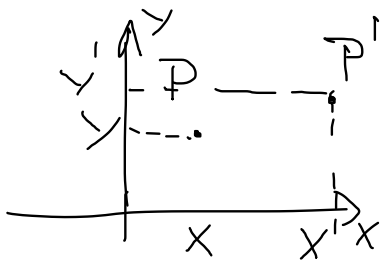


Abbildungen im Koordinatensystem

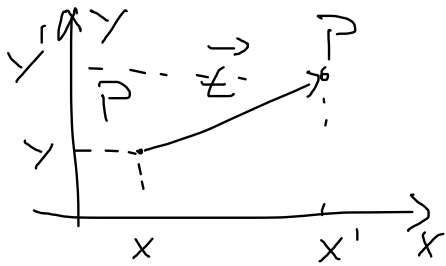


$$P(x; y) \rightarrow P'(x', y')$$

geometrische Beschr \leftrightarrow rechnerische Beschreibung

Die Verschiebung

Verschiebungsvektor $\vec{t} = \begin{pmatrix} t_x \\ t_y \end{pmatrix}$



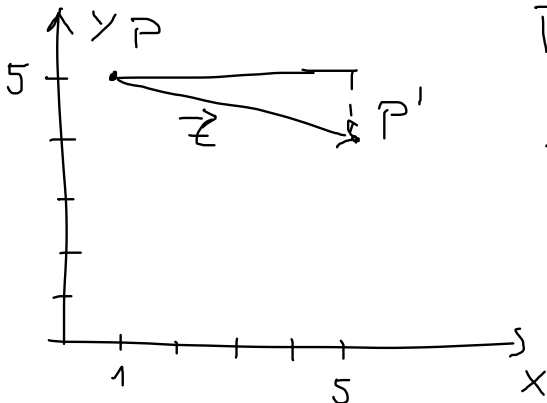
$$x' = x + t_x$$

$$y' = y + t_y$$

Beispiel $\vec{t} = \begin{pmatrix} 4 \\ -1 \end{pmatrix}$

$$P(1; 5)$$

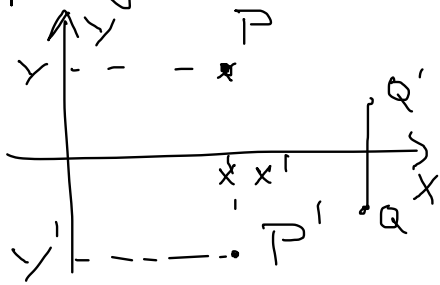
$$P'(5, 4)$$



$$x' = 1 + 4 = 5$$

$$y' = 5 + (-1) = 4$$

Spiegelung a.d. x-Achse



$$x' = x$$

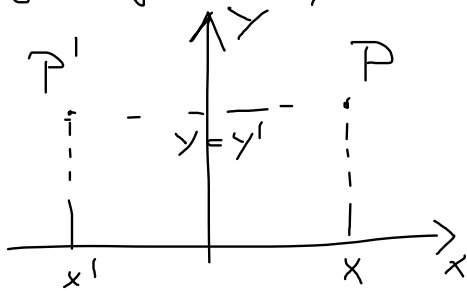
$$y' = -y$$

$$Q(5; -2) \quad x' = 5$$

$$y' = -(-2)$$

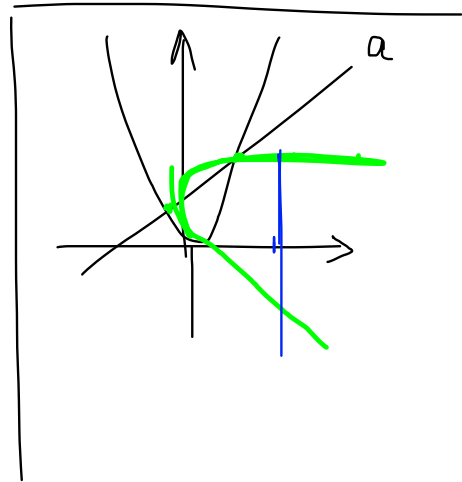
$$= +2$$

Spiegelung a.d. y-Achse

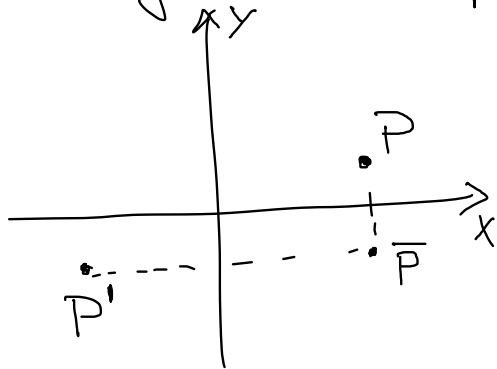


$$x' = -x$$

$$y' = y$$



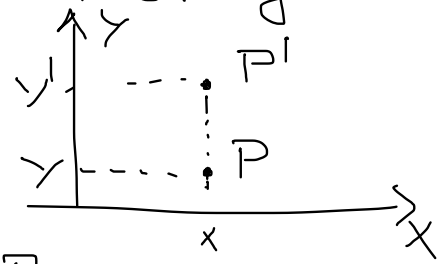
Drehung um den Ursprung um 180°



$$x' = -x$$

$$y' = -y$$

Streckung senkrecht zur x-Achse



Streckfaktor k

$$x' = x$$

$$y' = ky$$

$$\boxed{k > 0} \quad 0 < k < 1$$

Beispiele

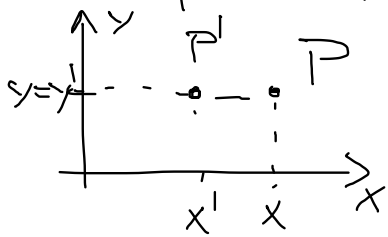
$$k = 3 \quad P(1; 4) \rightarrow P'(1, 12) \quad k > 1 \quad \begin{array}{l} \text{Stauchung} \\ \text{Streckung} \end{array}$$

$$Q(7; -2) \rightarrow Q'(7, -6)$$

$$k = \frac{1}{2} \quad P(1; 4) \rightarrow P'(1, 2)$$

Streckung senkrecht zur y-Achse

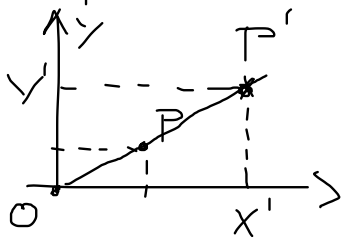
Streckfaktor k



$$x' = kx$$

$$y' = y$$

Zentrische Streckung mit $O(0,0)$ als Zentrum, Streckf. k



$$x' = kx$$

$$y' = ky$$

Anwendung auf eine Funktionsgraphen

$$y = x^2 \rightarrow z = \begin{pmatrix} 2 \\ -1 \end{pmatrix}$$

$$(0; 0) \quad (2, -1)$$

$$(1; 1) \quad (3, 0)$$

$$(2; 4) \quad (4; 3)$$

$$(3; 9) \quad (5; 8)$$

$$(-1; 1) \quad (1, 0)$$

$$(-2; 4) \quad (0; 3)$$

$$f(x) = x^2$$

