

$$1) \begin{pmatrix} -2 \\ 4 \\ 1 \end{pmatrix} \times \begin{pmatrix} 5 \\ 3 \\ 1 \end{pmatrix} = \begin{pmatrix} 4-3 \\ 5+2 \\ -6-20 \end{pmatrix} = \begin{pmatrix} 1 \\ 7 \\ -26 \end{pmatrix}$$

$$2) \vec{x} = \begin{pmatrix} -1 \\ 3 \end{pmatrix} + \alpha \begin{pmatrix} 2+1 \\ -6-3 \end{pmatrix} = \begin{pmatrix} -1 \\ 3 \end{pmatrix} + \alpha \begin{pmatrix} 3 \\ -9 \end{pmatrix}$$

$$y = m \cdot x + s \quad m = \frac{-6-3}{2+1} = \frac{-9}{3} = -3$$

$$3 = -3 \cdot (-1) + s \Rightarrow s = 0 \quad y = -3x$$

$$3) \begin{pmatrix} 4 \\ -3 \\ 2 \end{pmatrix} + \alpha \begin{pmatrix} 5 & -4 \\ -2 & 3 \\ 4 & -2 \end{pmatrix} = \begin{pmatrix} 4 \\ -3 \\ 2 \end{pmatrix} + \alpha \begin{pmatrix} 1 \\ 1 \\ 2 \end{pmatrix}$$

$$4) \begin{pmatrix} -1 \\ 4 \\ 3 \end{pmatrix} \begin{pmatrix} 2 \\ -1 \\ 2 \end{pmatrix} \begin{pmatrix} 5 \\ -6 \\ 1 \end{pmatrix}$$

$$\vec{x}: \begin{pmatrix} -1 \\ 4 \\ 3 \end{pmatrix} + \alpha \begin{pmatrix} 2 + 1 \\ -1 - 4 \\ 2 - 3 \end{pmatrix}$$

$$\vec{x}: \begin{pmatrix} -1 \\ 4 \\ 3 \end{pmatrix} + \alpha \begin{pmatrix} 3 \\ -5 \\ -1 \end{pmatrix} = \begin{pmatrix} 5 \\ -6 \\ 1 \end{pmatrix}$$

$$\alpha \begin{pmatrix} 3 \\ -5 \\ -1 \end{pmatrix} = \begin{pmatrix} 6 \\ -10 \\ -2 \end{pmatrix}$$

$\alpha = 2$
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$$\begin{vmatrix} \begin{matrix} +1 & 2 & 5 \\ 4 & -1 & -6 \\ 3 & 2 & 1 \end{matrix} \end{vmatrix} = \begin{matrix} \underline{1} - \underline{36} + \underline{40} = +15 \\ \ominus \\ -15 + 8 + 12 \\ \ominus \\ 5 \end{matrix} \} \mathcal{D}$$

4) 5)

$$\underbrace{\begin{pmatrix} 3 \\ -2 \\ -1 \end{pmatrix}}; \begin{pmatrix} 4 \\ -1 \\ 3 \end{pmatrix}, \begin{pmatrix} 2 \\ -1 \\ 2 \end{pmatrix}$$

$$\vec{x} = \begin{pmatrix} 3 \\ -2 \\ -1 \end{pmatrix} + \beta \begin{pmatrix} 4 & -3 \\ -1 & +2 \\ 3 & +1 \end{pmatrix} = \begin{pmatrix} 3 \\ -2 \\ -1 \end{pmatrix} + \beta \begin{pmatrix} 1 \\ 1 \\ 4 \end{pmatrix}$$

$$= \begin{pmatrix} 3 \\ -2 \\ -1 \end{pmatrix} + \beta \begin{pmatrix} 1 \\ 1 \\ 4 \end{pmatrix} = \begin{pmatrix} 2 \\ -1 \\ 2 \end{pmatrix}$$

$$\beta \begin{pmatrix} 1 \\ 1 \\ 4 \end{pmatrix} = \begin{pmatrix} -1 \\ 1 \\ 3 \end{pmatrix}$$

$$\begin{array}{l} \beta = -1 \\ \beta = 1 \\ \beta = 3/4 \end{array}$$

$$1) a) 1. \quad \begin{pmatrix} -2 \\ 8 \\ -4 \end{pmatrix} = \gamma \begin{pmatrix} 1 \\ -4 \\ 2 \end{pmatrix} \Leftrightarrow \begin{cases} -2 = \gamma \cdot 1 \\ 8 = \gamma \cdot (-4) \\ -4 = \gamma \cdot 2 \end{cases}$$

$$\begin{matrix} \rightarrow \\ \text{us} \end{matrix} \quad \begin{vmatrix} \gamma = -2 \\ \gamma = -2 \\ \gamma = -2 \end{vmatrix} \Rightarrow \text{Lineare Abhängigkeit}$$

$$\begin{pmatrix} 2 \\ -5 \\ 1 \end{pmatrix} = \underbrace{\begin{pmatrix} -1 \\ 3 \\ -2 \end{pmatrix}}_{\text{SA}} + \underbrace{\beta}_{\text{BETA}} \begin{pmatrix} 1 \\ -4 \\ 2 \end{pmatrix} \quad \begin{pmatrix} 3 \\ -8 \\ 3 \end{pmatrix} = \beta \cdot \begin{pmatrix} 1 \\ -4 \\ 2 \end{pmatrix}$$

$$\left. \begin{array}{l} \beta = 3 \\ \beta = 2 \\ \beta = 3/2 \end{array} \right\} \text{Widerspruch} \\ \Rightarrow \text{PARALLEL}$$