

Berechne die Beträge

$$\left| \begin{pmatrix} 2 \\ 3 \\ -1 \end{pmatrix} \right| = \sqrt{2^2 + 3^2 + (-1)^2} = \sqrt{14}$$

$$\left| \begin{pmatrix} 0 \\ 1 \\ -10 \end{pmatrix} \right| = \sqrt{0^2 + 1^2 + (-10)^2} = \sqrt{101}$$

$$\left| \begin{pmatrix} 2a \\ 2a \\ a \end{pmatrix} \right| = \sqrt{(2a)^2 + (2a)^2 + a^2} = \sqrt{9a^2} = 3 * |a|$$

Alternative:

$$\left| \begin{pmatrix} 2a \\ 2a \\ a \end{pmatrix} \right| = |a| * \left| \begin{pmatrix} 2 \\ 2 \\ 1 \end{pmatrix} \right| = |a| * \sqrt{2^2 + 2^2 + 1^2} = \sqrt{9} = 3 * |a|$$

Berechne die entsprechenden Einheitsvektoren

$$\vec{a} = \begin{pmatrix} 2 \\ 2 \\ 1 \end{pmatrix}$$

$$\vec{e}_a = \frac{1}{|\vec{a}|} \vec{a} = \frac{1}{\sqrt{2^2 + 2^2 + 1^2}} \begin{pmatrix} 2 \\ 2 \\ 1 \end{pmatrix} = \frac{1}{3} \begin{pmatrix} 2 \\ 2 \\ 1 \end{pmatrix} = \begin{pmatrix} 2/3 \\ 2/3 \\ 1/3 \end{pmatrix}$$

$$\vec{a} = \begin{pmatrix} 0 \\ -1 \\ 1 \end{pmatrix}$$

$$\vec{e}_a = \frac{1}{|\vec{a}|} \vec{a} = \frac{1}{\sqrt{0^2 + (-1)^2 + 1^2}} \begin{pmatrix} 0 \\ -1 \\ 1 \end{pmatrix} = \frac{1}{\sqrt{2}} \begin{pmatrix} 0 \\ -1 \\ 1 \end{pmatrix} = \begin{pmatrix} 0 \\ -1/\sqrt{2} \\ 1/\sqrt{2} \end{pmatrix}$$