

S 244 Nr. 1

$$a) \vec{a} = \begin{pmatrix} 1 \\ 0 \\ 2 \end{pmatrix}; |\vec{a}| = \sqrt{1^2 + 0^2 + 2^2} = \underline{\underline{\sqrt{5}}} \Rightarrow \vec{a}_0 = \frac{1}{\sqrt{5}} \begin{pmatrix} 1 \\ 0 \\ 2 \end{pmatrix}$$

$$b) \vec{b} = \begin{pmatrix} 3 \\ -2 \\ 1 \end{pmatrix}; |\vec{b}| = \sqrt{3^2 + (-2)^2 + 1^2} = \sqrt{14} \Rightarrow \vec{b}_0 = \frac{1}{\sqrt{14}} \begin{pmatrix} 3 \\ -2 \\ 1 \end{pmatrix}$$

$$c) \vec{c} = \begin{pmatrix} 0 \\ -1 \\ 0 \end{pmatrix}; |\vec{c}| = \sqrt{0^2 + (-1)^2 + 0^2} = 1 \Rightarrow \vec{c}_0 = \begin{pmatrix} 0 \\ -1 \\ 0 \end{pmatrix}$$

$$d) \vec{d} = \begin{pmatrix} 0,2 \\ 0,2 \\ 0,1 \end{pmatrix}; |\vec{d}| = \sqrt{\left(\frac{2}{10}\right)^2 + \left(\frac{2}{10}\right)^2 + \left(\frac{1}{10}\right)^2} = \frac{3}{10} \Rightarrow \vec{d}_0 = \frac{1}{\frac{3}{10}} \begin{pmatrix} 0,2 \\ 0,2 \\ 0,1 \end{pmatrix}$$
$$\vec{d}_0 = \frac{10}{3} \begin{pmatrix} 0,2 \\ 0,2 \\ 0,1 \end{pmatrix} = \begin{pmatrix} \frac{2}{3} \\ \frac{2}{3} \\ \frac{1}{3} \end{pmatrix}$$

$$e) \vec{e} = \begin{pmatrix} \sqrt{2} \\ \sqrt{3} \\ \sqrt{5} \end{pmatrix}; |\vec{e}| = \sqrt{(\sqrt{2})^2 + (\sqrt{3})^2 + (\sqrt{5})^2} = \sqrt{10} \Rightarrow \vec{e}_0 = \frac{1}{\sqrt{10}} \begin{pmatrix} \sqrt{2} \\ \sqrt{3} \\ \sqrt{5} \end{pmatrix}$$

$$f) |\vec{f}| = \frac{1}{4} \sqrt{26}; |\vec{g}| = 0,5$$

S 244 Nr. 2

$$\vec{p} = \begin{pmatrix} 1 \\ 0 \\ -1 \end{pmatrix}; \vec{q} = \begin{pmatrix} 2 \\ -1 \\ 3 \end{pmatrix}$$

$$a) \vec{p} + \vec{q} = \begin{pmatrix} 1 \\ 0 \\ -1 \end{pmatrix} + \begin{pmatrix} 2 \\ -1 \\ 3 \end{pmatrix} = \begin{pmatrix} 3 \\ -1 \\ 2 \end{pmatrix} \Rightarrow |\vec{p} + \vec{q}| = \sqrt{3^2 + (-1)^2 + 2^2} = \underline{\underline{\sqrt{14}}}$$

$$b) 3\vec{p} + \vec{q} = \begin{pmatrix} 3 \\ 0 \\ -3 \end{pmatrix} + \begin{pmatrix} 2 \\ -1 \\ 3 \end{pmatrix} = \begin{pmatrix} 5 \\ -1 \\ 0 \end{pmatrix} \Rightarrow |3\vec{p} + \vec{q}| = \sqrt{5^2 + (-1)^2 + 0^2} = \underline{\underline{\sqrt{26}}}$$

$$c) \vec{p} - 2\vec{q} = \begin{pmatrix} 1 \\ 0 \\ -1 \end{pmatrix} + \begin{pmatrix} -4 \\ 2 \\ -6 \end{pmatrix} = \begin{pmatrix} -3 \\ 2 \\ -7 \end{pmatrix} \Rightarrow |\vec{p} - 2\vec{q}| = \sqrt{(-3)^2 + 2^2 + (-7)^2} = \underline{\underline{\sqrt{62}}}$$

$$d) -\vec{p} + \frac{1}{2}\vec{q} = \begin{pmatrix} -1 \\ 0 \\ 1 \end{pmatrix} + \begin{pmatrix} 1 \\ -\frac{1}{2} \\ \frac{3}{2} \end{pmatrix} = \begin{pmatrix} 0 \\ -\frac{1}{2} \\ \frac{5}{2} \end{pmatrix} \Rightarrow |-\vec{p} + \frac{1}{2}\vec{q}| = \sqrt{0^2 + \left(-\frac{1}{2}\right)^2 + \left(\frac{5}{2}\right)^2} = \underline{\underline{\sqrt{\frac{26}{4}}}} = \underline{\underline{\frac{1}{2}\sqrt{26}}}$$