S 294 Nr. 2

b) $\alpha = 94{,}6^\circ$ $\beta = 38{,}5^\circ$ $\gamma = 46{,}9^\circ$

$|\vec{BC}| = 2\sqrt{34}$; $|\vec{AC}| = \sqrt{53}$; $|\vec{AB}| = \sqrt{73}$

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c) $\alpha = 50{,}8^\circ$; $\beta = 78{,}5^\circ$; $\gamma = 50{,}8^\circ$

$|\vec{BC}| = 2\sqrt{5}$; $|\vec{AC}| = 4\sqrt{2}$; $|\vec{AB}| = 2\sqrt{5}$

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d) $\alpha = 50{,}8^\circ$; $\beta = 39{,}2^\circ$; $\gamma = 90^\circ$

$|\vec{BC}| = 2\sqrt{3}$; $|\vec{AC}| = 2\sqrt{2}$; $|\vec{AB}| = 2\cdot\sqrt{5}$

S 294 Nr. 3

a) $\vec{a} = \begin{pmatrix} 3 \\ 2 \\ a \end{pmatrix}$; $\vec{b} = \begin{pmatrix} 1 \\ -2 \\ 2 \end{pmatrix}$; $\alpha = 90^\circ \Rightarrow \begin{pmatrix} 3 \\ 2 \\ a \end{pmatrix} \cdot \begin{pmatrix} 1 \\ -2 \\ 2 \end{pmatrix} = 0$

$$3\cdot 1 + 2\cdot(-2) + a\cdot 2 = 0$$
$$-1 + a\cdot 2 = 0$$
$$\underline{\underline{a = \tfrac{1}{2}}}$$

$\underline{\underline{a = \begin{pmatrix} 3 \\ 2 \\ 0{,}5 \end{pmatrix}}}$

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b) $\vec{a} = \begin{pmatrix} 0 \\ 1 \\ 0 \end{pmatrix}$; $\vec{b} = \begin{pmatrix} \sqrt{3} \\ b \\ 0 \end{pmatrix}$; $\alpha = 30^\circ \Rightarrow \cos(\alpha) = \frac{1}{2}\sqrt{3} \approx 0{,}866$

$$\cos(30^\circ) = \frac{1}{2}\sqrt{3} = \frac{0\cdot\sqrt{3} + b\cdot 1 + 0\cdot 0}{\sqrt{1}\cdot\sqrt{3+b^2}} = \frac{b}{\sqrt{3+b^2}} \quad \Big|\cdot\left(\sqrt{3+b^2}\cdot 2\right)$$

$$\sqrt{3}\cdot\sqrt{3+b^2} = 2b$$
$$\sqrt{3(3+b^2)} = 2b \quad |\ (\ )^2$$
$$3(3+b^2) = 4b^2$$
$$9 + 3b^2 = 4b^2$$
$$\underline{\underline{9 = b^2 \Rightarrow b = (\pm)\,3}}$$

Probe ergibt nur für $\underline{\underline{b = +3}}$ die richtige Lösung

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c) $\vec{a} = \begin{pmatrix} 0 \\ 0{,}5 \\ 0{,}5 \end{pmatrix}$; $\vec{b} = \begin{pmatrix} 1 \\ 0 \\ c \end{pmatrix}$; $\alpha = 60^\circ \Rightarrow \cos(60^\circ) = \frac{1}{2}$

$$\cos(60^\circ) = \frac{1}{2} = \frac{1\cdot 0 + 0\cdot 0{,}5 + 0{,}5\cdot c}{\sqrt{\frac{1}{4}+\frac{1}{4}}\cdot\sqrt{1+c^2}} = \frac{0{,}5\cdot c}{\sqrt{\frac{1}{2}(1+c^2)}} \quad \Big|\cdot\sqrt{\tfrac{1}{2}(1+c^2)}\cdot 2$$

$$\Rightarrow \sqrt{\tfrac{1}{2}(1+c^2)} = c \quad |\ (\ )^2 \Rightarrow \tfrac{1}{2}(1+c^2) = c^2 \Rightarrow \underline{\underline{c = (\pm)\,1}} \leftarrow \text{nach Probe}$$