LÖSUNG ZU 690a, b, c, d):

a) $\cos\alpha = \frac{\begin{pmatrix}1\\3\\-2\end{pmatrix}\cdot\begin{pmatrix}1\\3\\0\end{pmatrix}}{\left|\begin{pmatrix}1\\3\\-2\end{pmatrix}\right|\cdot\left|\begin{pmatrix}1\\3\\0\end{pmatrix}\right|} = \frac{1\cdot1+3\cdot3+(-2)\cdot0}{\sqrt{14}\cdot\sqrt{10}} = \frac{10}{\sqrt{14}\cdot\sqrt{10}} \approx 0{,}8451$

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

$\left|\begin{pmatrix}1\\3\\0\end{pmatrix}\right| = \sqrt{1^2+3^2+0^2} = \sqrt{10}$ $\alpha = 32{,}31°$

b) $\cos\alpha = \frac{\begin{pmatrix}1\\1\\1\end{pmatrix}\cdot\begin{pmatrix}0\\1\\1\end{pmatrix}}{\left|\begin{pmatrix}1\\1\\1\end{pmatrix}\right|\cdot\left|\begin{pmatrix}0\\1\\1\end{pmatrix}\right|} = \frac{1\cdot0+1\cdot1+1\cdot1}{\sqrt{3}\cdot\sqrt{2}} = \frac{2}{\sqrt{6}} \approx 0{,}8165$

$\alpha = 35{,}26°$

c) $\cos\alpha = \frac{\begin{pmatrix}0\\1\\0\end{pmatrix}\cdot\begin{pmatrix}1\\0\\1\end{pmatrix}}{\left|\begin{pmatrix}0\\1\\0\end{pmatrix}\right|\cdot\left|\begin{pmatrix}1\\0\\1\end{pmatrix}\right|} = \frac{0}{\sqrt{1}\cdot\sqrt{2}} = 0$

$\alpha = 90°$

d) analog: $\cos\alpha = 1$ $\alpha = 0°$