50/1 a)

$$\underline{A}+\underline{B}=\begin{pmatrix}1 & -2 & 3\\ -3 & 2 & 1\end{pmatrix}+\begin{pmatrix}3 & 1 & 2\\ 0 & 2 & 0\end{pmatrix}=\begin{pmatrix}1+3 & -2+1 & 3+2\\ -3+0 & 2+2 & 1+0\end{pmatrix}=\underline{\underline{\begin{pmatrix}4 & -1 & 5\\ -3 & 4 & 1\end{pmatrix}}}$$

$\underline{B}+\underline{C}$: A művelet ¬ végezhető el.

$\underline{C}+\underline{D}$: — " —

$$4\underline{A}-\underline{B}=4\begin{pmatrix}1 & -2 & 3\\ -3 & 2 & 1\end{pmatrix}-\begin{pmatrix}3 & 1 & 2\\ 0 & 2 & 0\end{pmatrix}=\begin{pmatrix}4 & -8 & 12\\ -12 & 8 & 4\end{pmatrix}-\begin{pmatrix}3 & 1 & 2\\ 0 & 2 & 0\end{pmatrix}=$$

$$=\begin{pmatrix}4-3 & -8-1 & 12-2\\ -12-0 & 8-2 & 4-0\end{pmatrix}=\underline{\underline{\begin{pmatrix}1 & -9 & 10\\ -12 & 6 & 4\end{pmatrix}}}$$

50/1 ⓑ $\underline{A} \cdot \underline{B}$: 1 elvégezhető, mert 1 egyezik a sorok és az oszlopok száma a A é B mátrixban

$$\underline{A}_{3\times 2} \cdot \underline{C}_{2\times 3} = \begin{pmatrix} 1 & -2 & 3 \\ -3 & 2 & 1 \end{pmatrix} \begin{pmatrix} 1 & 4 \\ 2 & 5 \\ -1 & 1 \end{pmatrix} = \begin{pmatrix} 1\cdot 1+(-2)2+3(-1) & 1\cdot 4+(-2)5+3\cdot 1 \\ (-3)1+2\cdot 2+1(-1) & -3\cdot 4+2\cdot 5+1\cdot 1 \end{pmatrix} =$$

$$= \begin{pmatrix} -6 & -3 \\ 0 & -1 \end{pmatrix}$$

$$\underline{B} \cdot \underline{C} = \begin{pmatrix} 3 & 1 & 2 \\ 0 & 2 & 0 \end{pmatrix} \begin{pmatrix} 1 & 4 \\ 2 & 5 \\ -1 & 1 \end{pmatrix} = \begin{pmatrix} 3\cdot 1+1\cdot 2+2(-1) & 3\cdot 4+1\cdot 5+2\cdot 1 \\ 0\cdot 1+2\cdot 2+0(-1) & 0\cdot 4+2\cdot 5+0\cdot 1 \end{pmatrix} =$$

$$= \begin{pmatrix} 3 & 19 \\ 4 & 10 \end{pmatrix}$$

$$\underline{B} \cdot \underline{D} = \begin{pmatrix} 3 & 1 & 2 \\ 0 & 2 & 0 \end{pmatrix} \cdot \begin{pmatrix} 1 & 0 & -1 \\ 3 & 1 & 2 \\ -1 & 1 & 0 \end{pmatrix} = \begin{pmatrix} 3\cdot 1+1\cdot 3+2(-1) & 1\cdot 1+2\cdot 1 & 3(-1)+1\cdot 2 \\ 2\cdot 3 & 2\cdot 1 & 2\cdot 2 \end{pmatrix} =$$

$$= \begin{pmatrix} 4 & 3 & -1 \\ 6 & 2 & 4 \end{pmatrix}$$

50/1c

$$\underline{A}^T = \begin{pmatrix} 1 & -3 \\ -2 & 2 \\ 3 & 1 \end{pmatrix} \qquad \underline{D}^T = \begin{pmatrix} 1 & 3 & -1 \\ 0 & 1 & 1 \\ -1 & 2 & 0 \end{pmatrix}$$

$$\underline{A}^T \cdot \underline{B} = \begin{pmatrix} 1 & -3 \\ -2 & 2 \\ 3 & 1 \end{pmatrix} \begin{pmatrix} 3 & 1 & 2 \\ 0 & 2 & 0 \end{pmatrix} =$$

$$= \begin{pmatrix} 3 & 1-6 & 2 \\ -6 & -2+4 & -4 \\ 9 & 3+2 & 6 \end{pmatrix} = \begin{pmatrix} 3 & -5 & 2 \\ -6 & 2 & -4 \\ 9 & 5 & 6 \end{pmatrix}$$

$$\underline{B}\,\underline{C} = \begin{pmatrix} 1\cdot 0+1\cdot(-2)+2\cdot 3 & 1\cdot 1+1\cdot(-5)+2\cdot 7 \\ (-2)\cdot 0+2\cdot(-2)+0\cdot 3 & (-2)\cdot 1+2\cdot(-5)+0\cdot 7 \end{pmatrix} = \begin{pmatrix} 4 & 10 \\ -4 & -12 \end{pmatrix}$$

52/2a Egyik művelet se végezhető el.

b) $\underline{A}\cdot\underline{B}$, $\underline{B}\cdot\underline{D}$ ¬ végezhető a művelet.

$$\underline{A}\cdot\underline{C} = \begin{pmatrix} -1 & 0 & 2 \\ 0 & 2 & 1 \\ -2 & 2 & 5 \end{pmatrix} \begin{pmatrix} 0 & 1 \\ -2 & -5 \\ 3 & 7 \end{pmatrix} = \begin{pmatrix} 6 & -1+14 \\ -4+3 & -10+7 \\ -4+15 & -2-10+35 \end{pmatrix} = \begin{pmatrix} 6 & 13 \\ -1 & -3 \\ 11 & 23 \end{pmatrix}$$

52/2c

$$\underline{A}^T = \begin{pmatrix} -1 & 0 & -2 \\ 0 & 2 & 2 \\ 2 & 1 & 5 \end{pmatrix}$$

$$\underline{D}^T = \begin{pmatrix} -1 & 5 \\ 0 & 1 \\ 1 & 2 \end{pmatrix}$$

1ZH 1a

$$(\underline{a}-\underline{b})\cdot\underline{c} = \left[\begin{pmatrix}-2\\0\\-1\end{pmatrix} - \begin{pmatrix}0\\-3\\1\end{pmatrix}\right]\cdot\begin{pmatrix}2\\1\\1\end{pmatrix} = \begin{pmatrix}-2\\3\\-2\end{pmatrix}\cdot\begin{pmatrix}2\\1\\1\end{pmatrix} = -4+3-2 = \underline{\underline{-3}}$$

b)

$$(\underline{b}+\underline{c})\times\underline{a} = \left[\begin{pmatrix}0\\-3\\1\end{pmatrix} + \begin{pmatrix}2\\1\\1\end{pmatrix}\right]\times\begin{pmatrix}-2\\0\\-1\end{pmatrix} = \begin{pmatrix}2\\-2\\2\end{pmatrix}\times\begin{pmatrix}-2\\0\\-1\end{pmatrix} = \begin{pmatrix}-2\cdot(-1) - 2\cdot 0\\ 2(-2) - 2\cdot(-1)\\ 2\cdot 0 - (-2)\cdot(-2)\end{pmatrix} =$$

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

c)

$$(\underline{a},\underline{b},\underline{c}) = (\underline{a}\times\underline{b})\cdot\underline{c} = \left[\begin{pmatrix}-2\\0\\-1\end{pmatrix}\times\begin{pmatrix}0\\-3\\1\end{pmatrix}\right]\cdot\underline{c} =$$

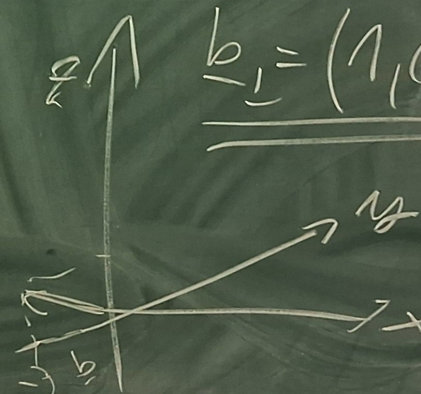
$$= \begin{pmatrix}0\cdot 1 - (-1)\cdot(-3)\\ (-1)\cdot 0 - (-2)\cdot 1\\ (-2)(-3) - 0\cdot 0\end{pmatrix}\cdot\underline{c} = \begin{pmatrix}-3\\+2\\6\end{pmatrix}\cdot\begin{pmatrix}2 & 1 & 1\end{pmatrix} = -6+2+6 = \underline{\underline{2}}$$

d) 1, mert $(a, b, c) = 2$

1.Z h) a) $(\underline{a}, \underline{b})\measuredangle = ?$

$$\underline{a} \cdot \underline{b} = |\underline{a}|\,|\underline{b}| \cdot \cos\gamma$$
$$\underline{a} \cdot \underline{b} = \sum_{i=1}^{3} a_i b_i$$
$$\Rightarrow \cos\gamma = \frac{\underline{a} \cdot \underline{b}}{|\underline{a}|\,|\underline{b}|} =$$

$$= \frac{-1}{\sqrt{5} \cdot \sqrt{10}} = -\frac{1}{5\sqrt{2}} = -\frac{\sqrt{2}}{10}$$



$\underline{b}_1 = (1, 0, 0)$