1. Legyen $a = i - j + 3k,\ b = 2j - k,\ c = i + 3j + 2k.$ $(1 + 2 + 2 + 1 + 2 + 2$ pont$)$

   (a) Mennyi ab ?

   (b) Mennyi $a \times b$?

   (c) Mennyi abc ?

   (d) Mennyi $(a \times b)c$?

   (e) Ird fel a $A = a$, $B = b$ pontokon athalado egyenes egy parameteres egyenletet!

   (f) Ird fel a $P = a$ pontot tartalmazo, $n = c$ normalvektoru sik egy egyenletet!

2. $(6 + 2 + 2$ pont$)$

   (a) Invertald pivotalas felhasznalasaval a kovetkezo matrixot:

$$A = \begin{pmatrix} 4 & 2 & 16 \\ 1 & 2 & 3 \\ 2 & 5 & 4 \end{pmatrix}$$

   (b) Mennyi $det(A)$?

   (c) Ellenorizd az eredmenyt!

3. Legyen $u = 1 - i$, $v = 2\left(\cos\left(\frac{2\pi}{4}\right) + i\sin\left(\frac{2\pi}{4}\right)\right)$. Mennyi $(4 \times 1 + 2 \times 3$ pont$)$

   (a) v algebrai alakja,

   (b) u trigonometrikus alakja,

   (c) $\bar{u}$,

   (d) $u\bar{u}$,

   (e) u^3,

   (f) $\sqrt[3]{u}$?

4. Adott harom pont: $A = (1, 0, 0)$, $B = (0, 0, 1)$, $C = (0, 1, 0)$. $(7 + 3$ pont$)$

   (a) Mennyi a C pont tavolsaga az A es B pontokon athalado egyenestol?

   (b) Mennyi az $b = B - A$ vektor meroleges vetulete a $c = C - A$ vektorra?

Megoldas

2.

$$
\begin{array}{cc} & \begin{array}{cccccc} a_1 & a_2 & a_3 & e_1 & e_2 & e_3 \end{array} \\ \begin{array}{c} e_1 \\ e_2 \\ e_3 \end{array} & \begin{pmatrix} 4 & 2 & 16 & 1 & 0 & 0 \\ 1_p & 2 & 3 & 0 & 1 & 0 \\ 2 & 5 & 4 & 0 & 0 & 1 \end{pmatrix} \end{array},
\begin{array}{cc} & \begin{array}{cccccc} a_1 & a_2 & a_3 & e_1 & e_2 & e_3 \end{array} \\ \begin{array}{c} e_1 \\ a_1 \\ e_3 \end{array} & \begin{pmatrix} 0 & -6 & 4 & 1 & -4 & 0 \\ 1 & 2 & 3 & 0 & 1 & 0 \\ 0 & 1_p & -2 & 0 & -2 & 1 \end{pmatrix} \end{array},
$$

$$
\begin{array}{cc} & \begin{array}{cccccc} a_1 & a_2 & a_3 & e_1 & e_2 & e_3 \end{array} \\ \begin{array}{c} e_1 \\ a_1 \\ a_2 \end{array} & \begin{pmatrix} 0 & 0 & -8_p & 1 & -16 & 6 \\ 1 & 0 & 7 & 0 & 5 & -2 \\ 0 & 1 & -2 & 0 & -2 & 1 \end{pmatrix} \end{array},
\begin{array}{cc} & \begin{array}{cccccc} a_1 & a_2 & a_3 & e_1 & e_2 & e_3 \end{array} \\ \begin{array}{c} a_3 \\ a_1 \\ a_2 \end{array} & \begin{pmatrix} 0 & 0 & 1 & -\frac{1}{8} & 2 & -\frac{3}{4} \\ 1 & 0 & 0 & \frac{7}{8} & -9 & \frac{13}{4} \\ 0 & 1 & 0 & -\frac{1}{4} & 2 & -\frac{1}{2} \end{pmatrix} \end{array}
$$

$$
\text{tehat } A^{-1} = \begin{pmatrix} \frac{7}{8} & -9 & \frac{13}{4} \\ -\frac{1}{4} & 2 & -\frac{1}{2} \\ -\frac{1}{8} & 2 & -\frac{3}{4} \end{pmatrix}
$$

$det(A) = 1_p \cdot 1_p \cdot (-8)_p$, mivel a $(1,2,3) \to (2,3,1)$ permutacio paros.