

Matematika I

Rešena 2. domača naloga

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Z oddajo domače naloge potrjujem, da sem domačo nalogo reševal samostojno.

V prostoru \mathbb{R}^3 naj bo dan paralelogram $ABCD$ z oglišči $A(-3, -2, 0)$, $B(3, -3, 1)$, $C(5, 0, 2)$, $D(-1, 1, 1)$.

1 Prva naloga

1.1 Navodila

Določi enačbo ravnine Π , na kateri leži paralelogram $ABCD$.

1.2 Reševanje naloge

$$\vec{a} = \vec{AB} \wedge \vec{b} = \vec{BC}$$

$$\vec{a} = \begin{bmatrix} 3 - (-3) = 6 \\ -3 - (-2) = -1 \\ 1 - 0 = 1 \end{bmatrix} = \begin{bmatrix} 6 \\ -1 \\ 1 \end{bmatrix}$$

$$\vec{b} = \begin{bmatrix} 5 - 3 = 2 \\ 0 - (-3) = 3 \\ 2 - 1 = 1 \end{bmatrix} = \begin{bmatrix} 2 \\ 3 \\ 1 \end{bmatrix}$$

$$\vec{a} \times \vec{b} = \vec{n}_1$$

$$\vec{n}_1 = \begin{vmatrix} \vec{i} & \vec{j} & \vec{k} \\ 6 & -1 & 1 \\ 2 & 3 & 1 \end{vmatrix} = \begin{bmatrix} -4 \\ -4 \\ 20 \end{bmatrix} \implies$$

$$\vec{n}_1 \parallel \vec{n}; \vec{n} = \begin{bmatrix} -1 \\ -1 \\ 5 \end{bmatrix} \quad (1)$$

$$ax + by + cz - d = 0; \vec{n} = \begin{bmatrix} a \\ b \\ c \end{bmatrix} \implies$$

$$-x - y + 5z - d = 0$$

$$C(5, 0, 2) \implies$$

$$-5 - 0 + 10 - d = 0 \implies d = 5$$

$$-x - y + 5z = 5$$

2 Druga naloga

2.1 Navodila

Naj bo K krožnica, ki gre skozi oglišča A , B in C paralelograma $ABCD$. Določi koordinate središča krožnice K .

2.2 Reševanje naloge

$$p = A + \frac{1}{2} \vec{a} \implies p(0, -\frac{5}{2}, \frac{1}{2})$$

$$q = B + \frac{1}{2} \vec{b} \implies q(4, -\frac{3}{2}, \frac{3}{2})$$

$$\vec{P} = \vec{a} \times \vec{n}$$

$$\vec{Q} = \vec{b} \times \vec{n}$$

$$\vec{P} = \begin{vmatrix} \vec{i} & \vec{j} & \vec{k} \\ 6 & -1 & 1 \\ -1 & -1 & 5 \end{vmatrix} = \begin{bmatrix} -4 \\ -31 \\ -7 \end{bmatrix}$$

$$\vec{Q} = \begin{vmatrix} \vec{i} & \vec{j} & \vec{k} \\ 2 & 3 & 1 \\ -1 & -1 & 5 \end{vmatrix} = \begin{bmatrix} 16 \\ -11 \\ 1 \end{bmatrix}$$

$$p + t\vec{p} = q + s\vec{q} \implies$$

$$0 + t(-4) = 4 + 16s$$

$$-\frac{5}{2} + t(-31) = -\frac{3}{2} + t(-11)$$

$$-t = 4s + 1$$

$$62t + 10 = 22s + 3$$

$$t = -\frac{1}{9}$$

$$s = -\frac{2}{9}$$

$$q + s\vec{q} = \begin{bmatrix} 4 \\ -\frac{3}{2} \\ \frac{3}{2} \end{bmatrix} + \left(-\frac{2}{9}\right) \begin{bmatrix} 16 \\ -11 \\ 1 \end{bmatrix} = \begin{bmatrix} \frac{4}{9} \\ \frac{17}{18} \\ \frac{23}{18} \end{bmatrix}$$

$$S \left(\frac{4}{9}, \frac{17}{18}, \frac{23}{18} \right)$$