Домашня робота

841

$|a| = 3 \qquad |b| = 4$

1) $[(a+b)(a-b)] = 25 \cdot \sin\frac{\pi}{2} = 25$

2) $[(3a-b),(a-2b)] = -6[a,b] + [a;b] = -5 \cdot 3 \cdot 4 = -60$

846 $[a,b]^2 \leq a^2b^2$

$[a,b]^2 = |a|^2\,|b|^2 \cdot \sin^2\alpha = a^2b^2\sin^2\alpha$

$-1 \leq \sin\alpha \leq 1$

$0 \leq \sin^2\alpha \leq 1 \Rightarrow a^2b^2\sin^2\alpha \leq a^2b^2$

$\sin\alpha = \pm 1$, $[a,b]^2 = a^2b^2$

851 $A(2;-1;2)$, $B(1;2;-1)$, $C(3;2;1)$

$\overline{AB} = (-1;3;-3)$, $\overline{AC} = (1;3;-1)$, $\overline{BC} = (2;0;2)$

1) $[AB, BC] = \{6;-4;-6\}$ $\qquad \begin{vmatrix} -1 & 3 & -3 \\ 2 & 0 & 2 \end{vmatrix}$

2) $[BC - 2CA, CB] = [BC, CB] + 2[AC, BC] = \begin{vmatrix} 1 & 3 & -1 \\ 2 & 0 & 2 \end{vmatrix}$

$= \{-12; 8; 12\}$

884 $m \perp Oz$; $m \perp \bar{a}$; $\bar{a} = \{8; -5; 3\}$

$|\bar{m}| = 52$; $m_x - ?$

$(\widehat{Ox}; \bar{m}) < \frac{\pi}{2}$

$\bar{m}(x; y; 0)$

$m \perp [\bar{a}; Oz] = \{-5; 8; 0\}$

$$\begin{vmatrix} 8 & -5 & 3 \\ 0 & 0 & 1 \end{vmatrix}$$

$m = \frac{\{45; -81; 0\}}{52} \cdot 3 = \{-45; -24; 0\}$

885 $M_1(2; -1; 3)$ $M_2(3; 1; 2)$ $\bar{n} = [n, M_1M_2] = \{9; -9; -9\}$

$a = \{3; -1; 4\}$

$$\begin{vmatrix} 1 & 2 & -1 \\ 3 & -1 & 4 \end{vmatrix}$$

$9(x-2) - 9(y+1) - 9(z-3) = 0$

$9x - 18 - 9y - 9 - 9z + 27 = 0$

$9x - 9y - 9z + 0 = 0$

886 $\Pi\ 2x + 6y + 3z - 5 = 0$ $m\Pi\ -6y - 6z + 2 = 0$

$\frac{2}{m} = \frac{6}{-6} = -\frac{1}{2}$

$m = 4$ $l = 3$

$\Pi\ 3x - y + 6z - 9 = 0$ $2x + my + 2z - 3 = 0$

$\frac{3}{2} = -\frac{1}{m} = \frac{6}{2}$ $m = -\frac{2}{3}$ $l = 3$

3) $2x - 5y + z = 0$ $x + 2z - 3 = 0$

$\frac{m}{2} = \frac{3}{-5} = \frac{2}{l}$ $m = -\frac{6}{5}$ $l = -\frac{10}{3}$

8)

$M_1(x_1, y_1, z_1)$ $M_2(x_2, y_2, z_2)$

$Ax + By + Cz + D = 0$

$\overline{M_1M_2} = \{x_2 - x_1; y_2 - y_1; z_2 - z_1\}$

$\vec{n} = \{A; B; C\}$

$M_3\{x; y; z\}$

$\overline{M_1M_3} = \{x - x_1; y - y_1; z - z_1\}$

$\overline{M_1M_3}$, $\overline{M_1M_2}$ и P — компланарны

$(\overline{M_1M_3}, \overline{M_1M_2}, \vec{n}) = 0$

$$\begin{vmatrix} x-x_1 & y-y_1 & z-z_1 \\ x_2-x_1 & y_2-y_1 & z_2-z_1 \\ A & B & C \end{vmatrix} = 0$$

9)

~~$2x - y + 6z - 3 = 0$~~ $2x - y + 2z - 3 = 0$

~~$3x + 2y - 6z - 1 = 0$~~ $3x + 2y - 6z - 1 = 0$

~~$M(x_1, x_2, x_3)$~~ $M(1; 2; -3)$

$$\frac{2x - y + 2z - 3}{\sqrt{9}} = \pm \frac{3x + 2y - 6z - 1}{\sqrt{49}}$$

$$14x - 7y + 14z - 14 = \pm(9x + 6y - 12z - 3)$$

$$\begin{cases} 5x - 13y + 26z - 11 = 0 \\ 23x - y - z + 25 = 0 \end{cases}$$

$M(1; 2; -3)$

$$\left| \frac{5 - 26 - 96 - 11}{\sqrt{25 + 13 + 26}} \right| \approx 3{,}86$$

$$\left| \frac{23 - 2 + 3 + 25}{\sqrt{23^2 + 1^2 + 1^2}} \right| \approx 0{,}39$$