Контрольная работа №2

№1

$\vec{n}$ - ?

$-3x+4y=-11 \Rightarrow \vec{n}(-3,4)$

№2

$L_1: \begin{cases} x=-11+8t \\ y=-11+2t \end{cases}$ $L_2: \begin{cases} x=6-15t \\ y=24-6t \end{cases}$

$\begin{cases} -14+8t_1=6-15t_2 \\ -11+2t_1=-4-6t_2 \end{cases}$

$\begin{cases} 8t_1+15t_2=20 \\ 2t_1+6t_2=7 \end{cases} \Rightarrow 2t_1=7-6t_2$

$4(7-6t_2)+15t_2=20$

$28-24t_2+15t_2=20$

$9t_2=8$

$t_2=\frac{8}{9}$

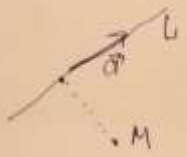
$\frac{7}{2}-\frac{16}{2}$

$\Rightarrow \begin{cases} t_1=\frac{7}{2}-\frac{8\cdot 3}{3\cdot 2} \\ t_2=\frac{8}{9} \end{cases}$ $\begin{cases} t_1=+\frac{5}{6} \\ t_2=\frac{8}{9} \end{cases}$

$\begin{cases} x=-11+\frac{4}{\cancel{8}}\cdot\frac{5}{3}=-\frac{23}{3} \\ y=-11+\frac{2\cdot 5}{6}=-\frac{28}{3} \end{cases}$

№3

$L: \frac{x+4}{1}=\frac{y+4}{-4}=\frac{z+1}{-2}$




$M(3,4,4)$

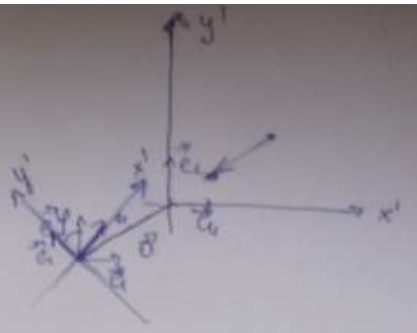
$\vec{a}(1,-4,-2)$

№4.

$A(2,-1)$

$\vec{e}_2(0,1)$

$\vec{e}_1(1,0)$

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$\vec{O}(-5,-1)$

$O(0,0) \to O'(-5,-1)$

$T = \begin{pmatrix} \frac{1}{2} & -\frac{\sqrt{3}}{2} \\ \frac{\sqrt{3}}{2} & \frac{1}{2} \end{pmatrix}$

$A(2,-1) \to A'(2,-1)$ и $A''(-3,-2)$

$$\begin{pmatrix} \frac{1}{2} & -\frac{\sqrt{3}}{2} \\ \frac{\sqrt{3}}{2} & \frac{1}{2} \end{pmatrix} \begin{pmatrix} 2 \\ -1 \end{pmatrix} \Rightarrow \begin{cases} x'' = 1 + \frac{\sqrt{3}}{2} \\ y'' = \sqrt{3} - \frac{1}{2} \end{cases}$$

$\left(1 + \frac{\sqrt{3}}{2} - 5,\ \sqrt{3} - \frac{1}{2} - 1\right) =$

№3. $\frac{x+4}{1} = \frac{y+4}{-4} = \frac{z+1}{-2}$ $\quad M(2,3,4)$

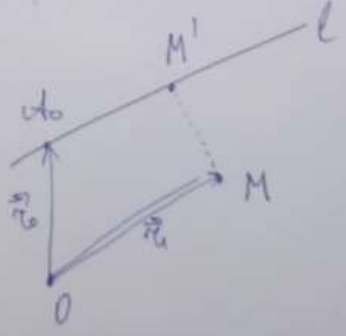
$\vec{a}(1,-4,-2)$

$A_0(-4,-4,-1)$

$\vec{r}_1(2,3,4)$

$\vec{r}_0(-4,-4,-1)$

$\vec{a}(1,-4,-2)$



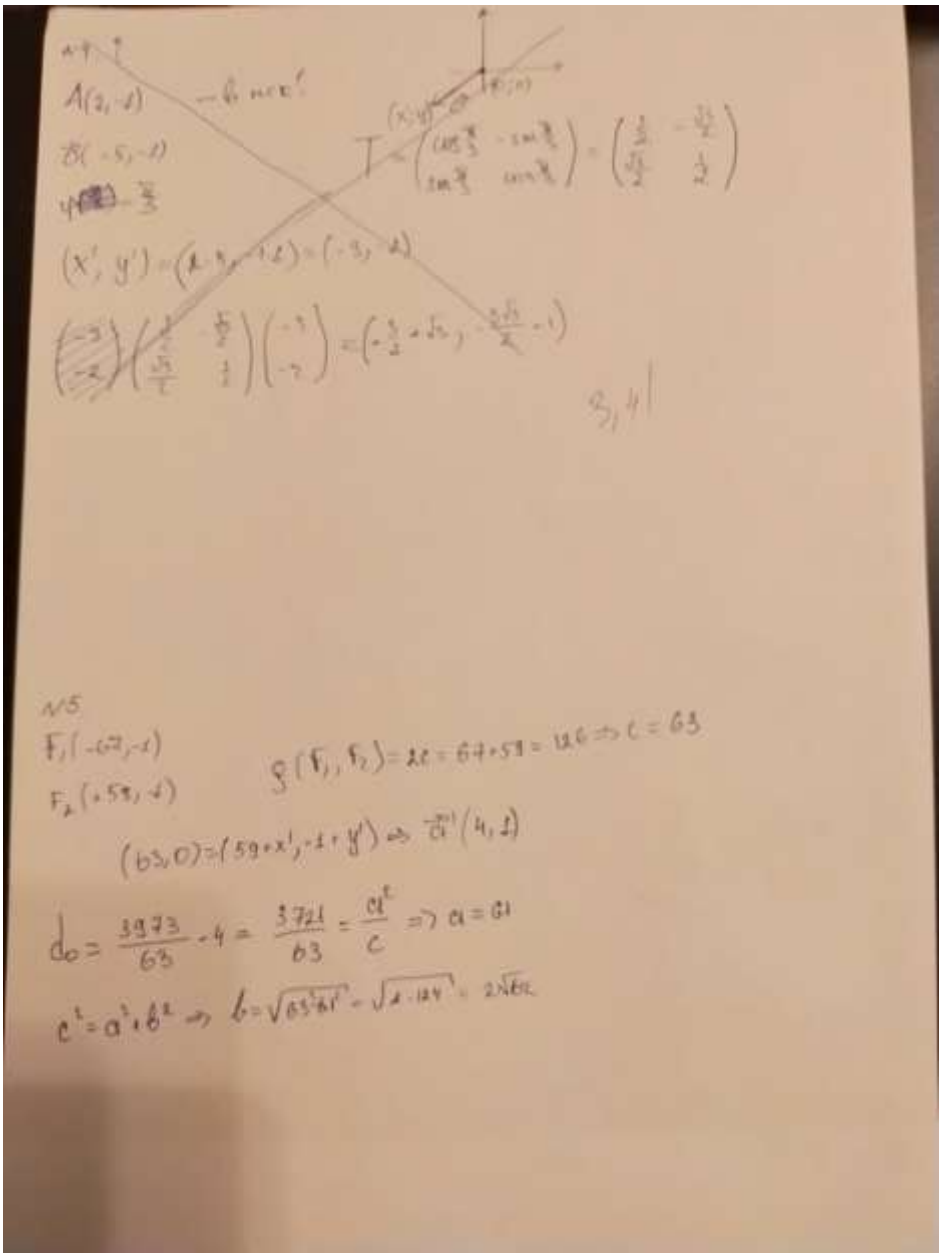

$$\overrightarrow{M_1M'} = \vec{r}_0 - \vec{r}_1 + \frac{(\vec{r}_1 - \vec{r}_0, \vec{a})}{(\vec{a},\vec{a})} \cdot \vec{a} = \left(-6 + \frac{32}{21} \cdot 1, -7 + \frac{32}{21} \cdot (-4), -5 + \frac{32}{21} \cdot (-2)\right)$$

$\vec{r}_0 - \vec{r}_1\ (-6,-7,-5)$

$(-6,-7,-5) \cdot (1,-4,-2) = -6 + 28 + 10 = 32$

$(\vec{a},\vec{a}) = |\vec{a}|^2 = 1 + 16 + 4 = 21$

$\frac{32}{21} = \frac{8 \cdot 4}{3 \cdot 7}$




$$T = \begin{pmatrix} \cos\frac{\pi}{3} & -\sin\frac{\pi}{3} \\ \sin\frac{\pi}{3} & \cos\frac{\pi}{3} \end{pmatrix} = \begin{pmatrix} \frac{1}{2} & -\frac{\sqrt{3}}{2} \\ \frac{\sqrt{3}}{2} & \frac{1}{2} \end{pmatrix}$$

$$\begin{pmatrix} -3 \\ -2 \end{pmatrix} \begin{pmatrix} \frac{1}{2} & -\frac{\sqrt{3}}{2} \\ \frac{\sqrt{3}}{2} & \frac{1}{2} \end{pmatrix} \begin{pmatrix} -3 \\ -2 \end{pmatrix} = \left(-\frac{3}{2} + \sqrt{3}, -\frac{3\sqrt{3}}{2} - 1\right)$$

3,4!

№5

$F_1(-67,-1)$

$F_2(59,-1)$

$S(F_1,F_2) = 2c = 67+59 = 126 \Rightarrow c = 63$

$(63,0) = (59+x', -1+y') \Rightarrow \vec{OA'}(4,1)$

$d_0 = \frac{3973}{63} - 4 = \frac{3721}{63} = \frac{a^2}{c} \Rightarrow a = 61$

$c^2 = a^2 + b^2 \Rightarrow b = \sqrt{63^2 - 61^2} = \sqrt{4 \cdot 124} = 2\sqrt{124}$

№6

$x^2+12x-2y^2-4y+3=0$

$x^2+2\cdot x\cdot 6+36-36-2(y^2+2y+1)+2+3=0$

$(x+6)^2-2(y-1)^2=31$

$\frac{(x+6)^2}{2}-\frac{(y-1)^2}{1}=\frac{31}{2}$

$\frac{(x+6)^2}{31}-\frac{(y-1)^2}{\frac{31}{2}}=1$

№7

$F(1,0)$ - фокус  P - парабола

$x=-3$ - директриса

$\exists A(x,y)\in P$

$\rho(A,x=-3)=\rho(A,F)$

$\sqrt{(x-1)^2+y^2}=|x+3|$

$(x-1)^2+y^2=(x+3)^2$

$y^2=(x+3-x+1)(x+3+x-1)$

$y^2=(4)(2x+2)$

$y^2=8x+8 \Rightarrow p=4$

№8.

$\frac{x^2}{a^2} - \frac{y^2}{b^2} = 1$ $A(\sqrt{5}; 2)$ $y = \pm 2x$ – асимптоты

$y = \pm \frac{b}{a} x \Rightarrow \frac{b}{a} = 2 \Rightarrow b = 2a$

$\frac{x^2}{a^2} - \frac{y^2}{4a^2} = 1 \mid \cdot a^2$

$a^2 = x^2 - \frac{1}{4} y^2 = 1 - \frac{1}{4} \cdot 4 = 1 \Rightarrow a = 1 \Rightarrow b = 2$

№9.

$z = -\sqrt{x^2 + y^2 - 1}$

$\begin{cases} z \le 0 \\ z^2 = x^2 + y^2 - 1 \end{cases} \quad \begin{cases} z \le 0 \\ x^2 + y^2 - z^2 = 1 \end{cases}$

$z = c$, $c = const \Rightarrow x^2 + y^2 = 1 + z^2 \Rightarrow$ линия

$y = e$, $e = const \Rightarrow x^2 - z^2 = 1 - e^2$

1) $e = 0 \Rightarrow$ гипербола

2) $e > 0 \Rightarrow$ $e = 1 \rightarrow$ точка; $e \neq 1 \Rightarrow$ гипербола

3) $e < 0 \Rightarrow$ гипербола

$\Rightarrow$ однополостный гиперболоид

№10.

$x^2 - \sqrt{3} xy - 1 = 0$

$tg 2\varphi = \frac{-\sqrt{3}}{1 - 0} = -\sqrt{3} \Rightarrow 2\varphi = -\frac{\pi}{3} + \pi k, k \in \mathbb{Z}$

$\varphi = -\frac{\pi}{6} + \frac{\pi}{2} k, k \in \mathbb{Z}$