

Task 1. Prove the linear independence of vectors \vec{p} , \vec{q} and \vec{r} , and decompose the vector \vec{x} in terms of the vector \vec{p} , \vec{q} and \vec{r} if they are linear independent

- 1.1. $\vec{x} = \{-2, 4, 7\}$, $\vec{p} = \{0, 1, 2\}$, $\vec{q} = \{1, 0, 1\}$, $\vec{r} = \{-1, 2, 4\}$.
- 1.2. $\vec{x} = \{6, 12, -1\}$, $\vec{p} = \{1, 3, 0\}$, $\vec{q} = \{2, -1, 1\}$, $\vec{r} = \{0, -1, 2\}$.
- 1.3. $\vec{x} = \{1, -4, 4\}$, $\vec{p} = \{2, 1, -1\}$, $\vec{q} = \{0, 3, 2\}$, $\vec{r} = \{1, -1, 1\}$.
- 1.4. $\vec{x} = \{-9, 5, 5\}$, $\vec{p} = \{4, 1, 1\}$, $\vec{q} = \{2, 0, -3\}$, $\vec{r} = \{-1, 2, 1\}$.
- 1.5. $\vec{x} = \{-5, -5, 5\}$, $\vec{p} = \{-2, 0, 1\}$, $\vec{q} = \{1, 3, -1\}$, $\vec{r} = \{0, 4, 1\}$.
- 1.6. $\vec{x} = \{13, 2, 7\}$, $\vec{p} = \{5, 1, 0\}$, $\vec{q} = \{2, -1, 3\}$, $\vec{r} = \{1, 0, -1\}$.
- 1.7. $\vec{x} = \{-19, -1, 7\}$, $\vec{p} = \{0, 1, 1\}$, $\vec{q} = \{-2, 0, 1\}$, $\vec{r} = \{3, 1, 0\}$.
- 1.8. $\vec{x} = \{3, -3, 4\}$, $\vec{p} = \{1, 0, 2\}$, $\vec{q} = \{0, 1, 1\}$, $\vec{r} = \{2, -1, 4\}$.
- 1.9. $\vec{x} = \{3, 3, -1\}$, $\vec{p} = \{3, 1, 0\}$, $\vec{q} = \{-1, 2, 1\}$, $\vec{r} = \{-1, 0, 2\}$.
- 1.10. $\vec{x} = \{-1, 7, -4\}$, $\vec{p} = \{-1, 2, 1\}$, $\vec{q} = \{2, 0, 3\}$, $\vec{r} = \{1, 1, -1\}$.
- 1.11. $\vec{x} = \{6, 5, -14\}$, $\vec{p} = \{1, 1, 4\}$, $\vec{q} = \{0, -3, 2\}$, $\vec{r} = \{2, 1, -1\}$.
- 1.12. $\vec{x} = \{6, -1, 7\}$, $\vec{p} = \{1, -2, 0\}$, $\vec{q} = \{-1, 1, 3\}$, $\vec{r} = \{1, 0, 4\}$.
- 1.13. $\vec{x} = \{5, 15, 0\}$, $\vec{p} = \{1, 0, 5\}$, $\vec{q} = \{-1, 3, 2\}$, $\vec{r} = \{0, -1, 1\}$.
- 1.14. $\vec{x} = \{2, -1, 11\}$, $\vec{p} = \{1, 1, 0\}$, $\vec{q} = \{0, 1, -2\}$, $\vec{r} = \{1, 0, 3\}$.
- 1.15. $\vec{x} = \{11, 5, -3\}$, $\vec{p} = \{1, 0, 2\}$, $\vec{q} = \{-1, 0, 1\}$, $\vec{r} = \{2, 5, -3\}$.
- 1.16. $\vec{x} = \{8, 0, 5\}$, $\vec{p} = \{2, 0, 1\}$, $\vec{q} = \{1, 1, 0\}$, $\vec{r} = \{4, 1, 2\}$.
- 1.17. $\vec{x} = \{3, 1, 8\}$, $\vec{p} = \{0, 1, 3\}$, $\vec{q} = \{1, 2, -1\}$, $\vec{r} = \{2, 0, -1\}$.
- 1.18. $\vec{x} = \{8, 1, 12\}$, $\vec{p} = \{1, 2, -1\}$, $\vec{q} = \{3, 0, 2\}$, $\vec{r} = \{-1, 1, 1\}$.
- 1.19. $\vec{x} = \{-9, -8, -3\}$, $\vec{p} = \{1, 4, 1\}$, $\vec{q} = \{-3, 2, 0\}$, $\vec{r} = \{1, -1, 2\}$.
- 1.20. $\vec{x} = \{-5, 9, -13\}$, $\vec{p} = \{0, 1, -2\}$, $\vec{q} = \{3, -1, 1\}$, $\vec{r} = \{4, 1, 0\}$.
- 1.21. $\vec{x} = \{-15, 5, 6\}$, $\vec{p} = \{0, 5, 1\}$, $\vec{q} = \{3, 2, -1\}$, $\vec{r} = \{-1, 1, 0\}$.
- 1.22. $\vec{x} = \{8, 9, 4\}$, $\vec{p} = \{1, 0, 1\}$, $\vec{q} = \{0, -2, 1\}$, $\vec{r} = \{1, 3, 0\}$.
- 1.23. $\vec{x} = \{23, -14, -30\}$, $\vec{p} = \{2, 1, 0\}$, $\vec{q} = \{1, -1, 0\}$, $\vec{r} = \{-3, 2, 5\}$.
- 1.24. $\vec{x} = \{3, 1, 3\}$, $\vec{p} = \{2, 1, 0\}$, $\vec{q} = \{1, 0, 1\}$, $\vec{r} = \{4, 2, 1\}$.

Task 2. Check the collinearity of the vectors \vec{c}_1 and \vec{c}_2 , which are given in the basis of the vectors \vec{a} and \vec{b} .

- 2.1. $\vec{a} = \{1, -2, 3\}$, $\vec{b} = \{3, 0, -1\}$, $\vec{c}_1 = 2\vec{a} + 4\vec{b}$, $\vec{c}_2 = 3\vec{b} - \vec{a}$.
- 2.2. $\vec{a} = \{1, 0, 1\}$, $\vec{b} = \{-2, 3, 5\}$, $\vec{c}_1 = \vec{a} + 2\vec{b}$, $\vec{c}_2 = 3\vec{a} - \vec{b}$.
- 2.3. $\vec{a} = \{-2, 4, 1\}$, $\vec{b} = \{1, -2, 7\}$, $\vec{c}_1 = 5\vec{a} + 3\vec{b}$, $\vec{c}_2 = 2\vec{a} - \vec{b}$.
- 2.4. $\vec{a} = \{1, 2, -3\}$, $\vec{b} = \{2, -1, -1\}$, $\vec{c}_1 = 4\vec{a} + 3\vec{b}$, $\vec{c}_2 = 8\vec{a} - \vec{b}$.
- 2.5. $\vec{a} = \{3, 5, 4\}$, $\vec{b} = \{5, 9, 7\}$, $\vec{c}_1 = -2\vec{a} + \vec{b}$, $\vec{c}_2 = 3\vec{a} - 2\vec{b}$.
- 2.6. $\vec{a} = \{1, 4, -2\}$, $\vec{b} = \{1, 1, -1\}$, $\vec{c}_1 = \vec{a} + \vec{b}$, $\vec{c}_2 = 4\vec{a} + 2\vec{b}$.
- 2.7. $\vec{a} = \{1, -2, 5\}$, $\vec{b} = \{3, -1, 0\}$, $\vec{c}_1 = 4\vec{a} - 2\vec{b}$, $\vec{c}_2 = \vec{b} - 2\vec{a}$.

- 2.8. $\mathbf{a} = \{3, 4, -1\}$, $\mathbf{b} = \{2, -1, 1\}$, $\mathbf{c}_1 = 6\mathbf{a} - 3\mathbf{b}$, $\mathbf{c}_2 = \mathbf{b} - 2\mathbf{a}$.
 2.9. $\mathbf{a} = \{-2, -3, -2\}$, $\mathbf{b} = \{1, 0, 5\}$, $\mathbf{c}_1 = 3\mathbf{a} + 9\mathbf{b}$, $\mathbf{c}_2 = -\mathbf{a} - 3\mathbf{b}$.
 2.10. $\mathbf{a} = \{-1, 4, 2\}$, $\mathbf{b} = \{3, -2, 6\}$, $\mathbf{c}_1 = 2\mathbf{a} - \mathbf{b}$, $\mathbf{c}_2 = 3\mathbf{b} - 6\mathbf{a}$.
 2.11. $\mathbf{a} = \{5, 0, -1\}$, $\mathbf{b} = \{7, 2, 3\}$, $\mathbf{c}_1 = 2\mathbf{a} - \mathbf{b}$, $\mathbf{c}_2 = 3\mathbf{b} - 6\mathbf{a}$.
 2.12. $\mathbf{a} = \{0, 3, -2\}$, $\mathbf{b} = \{1, -2, 1\}$, $\mathbf{c}_1 = 5\mathbf{a} - 2\mathbf{b}$, $\mathbf{c}_2 = 3\mathbf{a} + 5\mathbf{b}$.
 2.13. $\mathbf{a} = \{-2, 7, -1\}$, $\mathbf{b} = \{-3, 5, 2\}$, $\mathbf{c}_1 = 2\mathbf{a} + 3\mathbf{b}$, $\mathbf{c}_2 = 3\mathbf{a} + 2\mathbf{b}$.
 2.14. $\mathbf{a} = \{3, 7, 0\}$, $\mathbf{b} = \{1, -3, 4\}$, $\mathbf{c}_1 = 4\mathbf{a} - 2\mathbf{b}$, $\mathbf{c}_2 = \mathbf{b} - 2\mathbf{a}$.
 2.15. $\mathbf{a} = \{-1, 2, -1\}$, $\mathbf{b} = \{2, -7, 1\}$, $\mathbf{c}_1 = 6\mathbf{a} - 2\mathbf{b}$, $\mathbf{c}_2 = \mathbf{b} - 3\mathbf{a}$.
 2.16. $\mathbf{a} = \{7, 9, -2\}$, $\mathbf{b} = \{5, 4, 3\}$, $\mathbf{c}_1 = 4\mathbf{a} - \mathbf{b}$, $\mathbf{c}_2 = 4\mathbf{b} - \mathbf{a}$.
 2.17. $\mathbf{a} = \{5, 0, -2\}$, $\mathbf{b} = \{6, 4, 3\}$, $\mathbf{c}_1 = 5\mathbf{a} - 3\mathbf{b}$, $\mathbf{c}_2 = 6\mathbf{b} - 10\mathbf{a}$.
 2.18. $\mathbf{a} = \{8, 3, -1\}$, $\mathbf{b} = \{4, 1, 3\}$, $\mathbf{c}_1 = 2\mathbf{a} - \mathbf{b}$, $\mathbf{c}_2 = 2\mathbf{b} - 4\mathbf{a}$.
 2.19. $\mathbf{a} = \{3, -1, 6\}$, $\mathbf{b} = \{5, 7, 10\}$, $\mathbf{c}_1 = 4\mathbf{a} - 2\mathbf{b}$, $\mathbf{c}_2 = \mathbf{b} - 2\mathbf{a}$.
 2.20. $\mathbf{a} = \{1, -2, 4\}$, $\mathbf{b} = \{7, 3, 5\}$, $\mathbf{c}_1 = 6\mathbf{a} - 3\mathbf{b}$, $\mathbf{c}_2 = \mathbf{b} - 2\mathbf{a}$.
 2.21. $\mathbf{a} = \{3, 7, 0\}$, $\mathbf{b} = \{4, 6, -1\}$, $\mathbf{c}_1 = 3\mathbf{a} + 2\mathbf{b}$, $\mathbf{c}_2 = 5\mathbf{a} - 7\mathbf{b}$.
 2.22. $\mathbf{a} = \{2, -1, 4\}$, $\mathbf{b} = \{3, -7, -6\}$, $\mathbf{c}_1 = 2\mathbf{a} - 3\mathbf{b}$, $\mathbf{c}_2 = 3\mathbf{a} - 2\mathbf{b}$.
 2.23. $\mathbf{a} = \{5, -1, -2\}$, $\mathbf{b} = \{6, 0, 7\}$, $\mathbf{c}_1 = 3\mathbf{a} - 2\mathbf{b}$, $\mathbf{c}_2 = 4\mathbf{b} - 6\mathbf{a}$.
 2.24. $\mathbf{a} = \{-9, 5, 3\}$, $\mathbf{b} = \{7, 1, -2\}$, $\mathbf{c}_1 = 2\mathbf{a} - \mathbf{b}$, $\mathbf{c}_2 = 3\mathbf{a} + 5\mathbf{b}$.

Task 3. Find the angle between two nonzero vectors: \overline{AB} and \overline{AC} , and the projection of the vector \overline{AB} on the vector \overline{AC} .

- 3.1. $A(1, -2, 3)$, $B(0, -1, 2)$, $C(3, -4, 5)$.
 3.2. $A(0, -3, 6)$, $B(-12, -3, -3)$, $C(-9, -3, -6)$.
 3.3. $A(3, 3, -1)$, $B(5, 5, -2)$, $C(4, 1, 1)$.
 3.4. $A(-1, 2, -3)$, $B(3, 4, -6)$, $C(1, 1, -1)$.
 3.5. $A(-4, -2, 0)$, $B(-1, -2, 4)$, $C(3, -2, 1)$.
 3.6. $A(5, 3, -1)$, $B(5, 2, 0)$, $C(6, 4, -1)$.
 3.7. $A(-3, -7, -5)$, $B(0, -1, -2)$, $C(2, 3, 0)$.
 3.8. $A(2, -4, 6)$, $B(0, -2, 4)$, $C(6, -8, 10)$.
 3.9. $A(0, 1, -2)$, $B(3, 1, 2)$, $C(4, 1, 1)$.
 3.10. $A(3, 3, -1)$, $B(1, 5, -2)$, $C(4, 1, 1)$.
 3.11. $A(2, 1, -1)$, $B(6, -1, -4)$, $C(4, 2, 1)$.
 3.12. $A(-1, -2, 1)$, $B(-4, -2, 5)$, $C(-8, -2, 2)$.
 3.13. $A(6, 2, -3)$, $B(6, 3, -2)$, $C(7, 3, -3)$.
 3.14. $A(0, 0, 4)$, $B(-3, -6, 1)$, $C(-5, -10, -1)$.
 3.15. $A(2, -8, -1)$, $B(4, -6, 0)$, $C(-2, -5, -1)$.
 3.16. $A(3, -6, 9)$, $B(0, -3, 6)$, $C(9, -12, 15)$.

- 3.17. $A(0, 2, -4), B(8, 2, 2), C(6, 2, 4)$.
 3.18. $A(3, 3, -1), B(5, 1, -2), C(4, 1, 1)$.
 3.19. $A(-4, 3, 0), B(0, 1, 3), C(-2, 4, -2)$.
 3.20. $A(1, -1, 0), B(-2, -1, 4), C(8, -1, -1)$.
 3.21. $A(7, 0, 2), B(7, 1, 3), C(8, -1, 2)$.
 3.22. $A(2, 3, 2), B(-1, -3, -1), C(-3, -7, -3)$.
 3.23. $A(2, 2, 7), B(0, 0, 6), C(-2, 5, 7)$.
 3.24. $A(-1, 2, -3), B(0, 1, -2), C(-3, 4, -5)$.

Task 4. Find the area of a parallelogram constructed on vectors \vec{a} and \vec{b} which are given in terms of the vectors \vec{p} and \vec{q} with the angle known between them, and find an altitude of the parallelogram which is dropped on the side coinciding with the vector \vec{a} .

- 4.1. $\vec{a} = \vec{p} + 2\vec{q}, \vec{b} = 3\vec{p} - \vec{q}; |\vec{p}| = 1, |\vec{q}| = 2, (\widehat{pq}) = \pi/6$.
 4.2. $\vec{a} = 3\vec{p} + \vec{q}, \vec{b} = \vec{p} - 2\vec{q}; |\vec{p}| = 4, |\vec{q}| = 1, (\widehat{pq}) = \pi/4$.
 4.3. $\vec{a} = \vec{p} - 3\vec{q}, \vec{b} = \vec{p} + 2\vec{q}; |\vec{p}| = 1/5, |\vec{q}| = 1, (\widehat{pq}) = \pi/2$.
 4.4. $\vec{a} = 3\vec{p} - 2\vec{q}, \vec{b} = \vec{p} + 5\vec{q}; |\vec{p}| = 4, |\vec{q}| = 1/2, (\widehat{pq}) = 5\pi/6$.
 4.5. $\vec{a} = \vec{p} - 2\vec{q}, \vec{b} = 2\vec{p} + \vec{q}; |\vec{p}| = 2, |\vec{q}| = 3, (\widehat{pq}) = 3\pi/4$.
 4.6. $\vec{a} = \vec{p} + 3\vec{q}, \vec{b} = \vec{p} - 2\vec{q}; |\vec{p}| = 2, |\vec{q}| = 3, (\widehat{pq}) = \pi/3$.
 4.7. $\vec{a} = 2\vec{p} - \vec{q}, \vec{b} = \vec{p} + 3\vec{q}; |\vec{p}| = 3, |\vec{q}| = 2, (\widehat{pq}) = \pi/2$.
 4.8. $\vec{a} = 4\vec{p} + \vec{q}, \vec{b} = \vec{p} - \vec{q}; |\vec{p}| = 7, |\vec{q}| = 2, (\widehat{pq}) = \pi/4$.
 4.9. $\vec{a} = \vec{p} - 4\vec{q}, \vec{b} = 3\vec{p} + \vec{q}; |\vec{p}| = 1, |\vec{q}| = 2, (\widehat{pq}) = \pi/6$.
 4.10. $\vec{a} = \vec{p} + 4\vec{q}, \vec{b} = 2\vec{p} - \vec{q}; |\vec{p}| = 7, |\vec{q}| = 2, (\widehat{pq}) = \pi/3$.
 4.11. $\vec{a} = 3\vec{p} + 2\vec{q}, \vec{b} = \vec{p} - \vec{q}; |\vec{p}| = 10, |\vec{q}| = 1, (\widehat{pq}) = \pi/2$.
 4.12. $\vec{a} = 4\vec{p} - \vec{q}, \vec{b} = \vec{p} + 2\vec{q}; |\vec{p}| = 5, |\vec{q}| = 4, (\widehat{pq}) = \pi/4$.
 4.13. $\vec{a} = 2\vec{p} + 3\vec{q}, \vec{b} = \vec{p} - 2\vec{q}; |\vec{p}| = 6, |\vec{q}| = 7, (\widehat{pq}) = \pi/3$.
 4.14. $\vec{a} = 3\vec{p} - \vec{q}, \vec{b} = \vec{p} + 2\vec{q}; |\vec{p}| = 3, |\vec{q}| = 4, (\widehat{pq}) = \pi/3$.
 4.15. $\vec{a} = 2\vec{p} + 3\vec{q}, \vec{b} = \vec{p} - 2\vec{q}; |\vec{p}| = 2, |\vec{q}| = 3, (\widehat{pq}) = \pi/4$.

- 4.16. $\mathbf{a} = 2\mathbf{p} - 3\mathbf{q}$, $\mathbf{b} = 3\mathbf{p} + \mathbf{q}$; $|\mathbf{p}| = 4$, $|\mathbf{q}| = 1$, $(\widehat{\mathbf{pq}}) = \pi/6$.
- 4.17. $\mathbf{a} = 5\mathbf{p} + \mathbf{q}$, $\mathbf{b} = \mathbf{p} - 3\mathbf{q}$; $|\mathbf{p}| = 1$, $|\mathbf{q}| = 2$, $(\widehat{\mathbf{pq}}) = \pi/3$.
- 4.18. $\mathbf{a} = 7\mathbf{p} - 2\mathbf{q}$, $\mathbf{b} = \mathbf{p} + 3\mathbf{q}$; $|\mathbf{p}| = 1/2$, $|\mathbf{q}| = 2$, $(\widehat{\mathbf{pq}}) = \pi/2$.
- 4.19. $\mathbf{a} = 6\mathbf{p} - \mathbf{q}$, $\mathbf{b} = \mathbf{p} + \mathbf{q}$; $|\mathbf{p}| = 3$, $|\mathbf{q}| = 4$, $(\widehat{\mathbf{pq}}) = \pi/4$.
- 4.20. $\mathbf{a} = 10\mathbf{p} + \mathbf{q}$, $\mathbf{b} = 3\mathbf{p} - 2\mathbf{q}$; $|\mathbf{p}| = 4$, $|\mathbf{q}| = 1$, $(\widehat{\mathbf{pq}}) = \pi/6$.
- 4.21. $\mathbf{a} = 6\mathbf{p} - \mathbf{q}$, $\mathbf{b} = \mathbf{p} + 2\mathbf{q}$; $|\mathbf{p}| = 8$, $|\mathbf{q}| = 1/2$, $(\widehat{\mathbf{pq}}) = \pi/3$.
- 4.22. $\mathbf{a} = 3\mathbf{p} + 4\mathbf{q}$, $\mathbf{b} = \mathbf{q} - \mathbf{p}$; $|\mathbf{p}| = 2,5$, $|\mathbf{q}| = 2$, $(\widehat{\mathbf{pq}}) = \pi/2$.
- 4.23. $\mathbf{a} = 7\mathbf{p} + \mathbf{q}$, $\mathbf{b} = \mathbf{p} - 3\mathbf{q}$; $|\mathbf{p}| = 3$, $|\mathbf{q}| = 1$, $(\widehat{\mathbf{pq}}) = 3\pi/4$.
- 4.24. $\mathbf{a} = \mathbf{p} + 3\mathbf{q}$, $\mathbf{b} = 3\mathbf{p} - \mathbf{q}$; $|\mathbf{p}| = 3$, $|\mathbf{q}| = 5$, $(\widehat{\mathbf{pq}}) = 2\pi/3$.

Task 5. Check the coplanarity of vectors \vec{a} , \vec{b} and \vec{c} .

- 5.1. $\mathbf{a} = \{2, 3, 1\}$, $\mathbf{b} = \{-1, 0, -1\}$, $\mathbf{c} = \{2, 2, 2\}$.
- 5.2. $\mathbf{a} = \{3, 2, 1\}$, $\mathbf{b} = \{2, 3, 4\}$, $\mathbf{c} = \{3, 1, -1\}$.
- 5.3. $\mathbf{a} = \{1, 5, 2\}$, $\mathbf{b} = \{-1, 1, -1\}$, $\mathbf{c} = \{1, 1, 1\}$.
- 5.4. $\mathbf{a} = \{1, -1, -3\}$, $\mathbf{b} = \{3, 2, 1\}$, $\mathbf{c} = \{2, 3, 4\}$.
- 5.5. $\mathbf{a} = \{3, 3, 1\}$, $\mathbf{b} = \{1, -2, 1\}$, $\mathbf{c} = \{1, 1, 1\}$.
- 5.6. $\mathbf{a} = \{3, 1, -1\}$, $\mathbf{b} = \{-2, -1, 0\}$, $\mathbf{c} = \{5, 2, -1\}$.
- 5.7. $\mathbf{a} = \{4, 3, 1\}$, $\mathbf{b} = \{1, -2, 1\}$, $\mathbf{c} = \{2, 2, 2\}$.
- 5.8. $\mathbf{a} = \{4, 3, 1\}$, $\mathbf{b} = \{6, 7, 4\}$, $\mathbf{c} = \{2, 0, -1\}$.
- 5.9. $\mathbf{a} = \{3, 2, 1\}$, $\mathbf{b} = \{1, -3, -7\}$, $\mathbf{c} = \{1, 2, 3\}$.
- 5.10. $\mathbf{a} = \{3, 7, 2\}$, $\mathbf{b} = \{-2, 0, -1\}$, $\mathbf{c} = \{2, 2, 1\}$.
- 5.11. $\mathbf{a} = \{1, -2, 6\}$, $\mathbf{b} = \{1, 0, 1\}$, $\mathbf{c} = \{2, -6, 17\}$.
- 5.12. $\mathbf{a} = \{6, 3, 4\}$, $\mathbf{b} = \{-1, -2, -1\}$, $\mathbf{c} = \{2, 1, 2\}$.
- 5.13. $\mathbf{a} = \{7, 3, 4\}$, $\mathbf{b} = \{-1, -2, -1\}$, $\mathbf{c} = \{4, 2, 4\}$.
- 5.14. $\mathbf{a} = \{2, 3, 2\}$, $\mathbf{b} = \{4, 7, 5\}$, $\mathbf{c} = \{2, 0, -1\}$.

- 5.15. $a = \{5, 3, 4\}$, $b = \{-1, 0, -1\}$, $c = \{4, 2, 4\}$.
 5.16. $a = \{3, 10, 5\}$, $b = \{-2, -2, -3\}$, $c = \{2, 4, 3\}$.
 5.17. $a = \{-2, -4, -3\}$, $b = \{4, 3, 1\}$, $c = \{6, 7, 4\}$.
 5.18. $a = \{3, 1, -1\}$, $b = \{1, 0, -1\}$, $c = \{8, 3, -2\}$.
 5.19. $a = \{4, 2, 2\}$, $b = \{-3, -3, -3\}$, $c = \{2, 1, 2\}$.
 5.20. $a = \{4, 1, 2\}$, $b = \{9, 2, 5\}$, $c = \{1, 1, -1\}$.
 5.21. $a = \{5, 3, 4\}$, $b = \{4, 3, 3\}$, $c = \{9, 5, 8\}$.
 5.22. $a = \{3, 4, 2\}$, $b = \{1, 1, 0\}$, $c = \{8, 11, 6\}$.
 5.23. $a = \{4, -1, -6\}$, $b = \{1, -3, -7\}$, $c = \{2, -1, -4\}$.
 5.24. $a = \{3, 1, 0\}$, $b = \{-5, -4, -5\}$, $c = \{4, 2, 4\}$.

Task 6. Calculate the volume of a tetrahedron whose vertices are given by points A_1, A_2, A_3 and A_4 , and its attitude dropped from the point A_4 on the face $A_1A_2A_3$.

- 6.1. $A_1 (1, 3, 6), A_2 (2, 2, 1), A_3 (-1, 0, 1), A_4 (-4, 6, -3)$.
 6.2. $A_1 (-4, 2, 6), A_2 (2, -3, 0), A_3 (-10, 5, 8), A_4 (-5, 2, -4)$.
 6.3. $A_1 (7, 2, 4), A_2 (7, -1, -2), A_3 (3, 3, 1), A_4 (-4, 2, 1)$.
 6.4. $A_1 (2, 1, 4), A_2 (-1, 5, -2), A_3 (-7, -3, 2), A_4 (-6, -3, 6)$.
 6.5. $A_1 (-1, -5, 2), A_2 (-6, 0, -3), A_3 (3, 6, -3), A_4 (-10, 6, 7)$.
 6.6. $A_1 (0, -1, -1), A_2 (-2, 3, 5), A_3 (1, -5, -9), A_4 (-1, -6, 3)$.
 6.7. $A_1 (5, 2, 0), A_2 (2, 5, 0), A_3 (1, 2, 4), A_4 (-1, 1, 1)$.
 6.8. $A_1 (2, -1, -2), A_2 (1, 2, 1), A_3 (5, 0, -6), A_4 (-10, 9, -7)$.
 6.9. $A_1 (-2, 0, -4), A_2 (-1, 7, 1), A_3 (4, -8, -4), A_4 (1, -4, 6)$.
 6.10. $A_1 (14, 4, 5), A_2 (-5, -3, 2), A_3 (-2, -6, -3), A_4 (-2, 2, -1)$.
 6.11. $A_1 (1, 2, 0), A_2 (3, 0, -3), A_3 (5, 2, 6), A_4 (8, 4, -9)$.
 6.12. $A_1 (2, -1, 2), A_2 (1, 2, -1), A_3 (3, 2, 1), A_4 (-4, 2, 5)$.
 6.13. $A_1 (1, 1, 2), A_2 (-1, 1, 3), A_3 (2, -2, 4), A_4 (-1, 0, -2)$.
 6.14. $A_1 (2, 3, 1), A_2 (4, 1, -2), A_3 (6, 3, 7), A_4 (7, 5, -3)$.
 6.15. $A_1 (1, 1, -1), A_2 (2, 3, 1), A_3 (3, 2, 1), A_4 (5, 9, -8)$.
 6.16. $A_1 (1, 5, -7), A_2 (-3, 6, 3), A_3 (-2, 7, 3), A_4 (-4, 8, -12)$.
 6.17. $A_1 (-3, 4, -7), A_2 (1, 5, -4), A_3 (-5, -2, 0), A_4 (2, 5, 4)$.
 6.18. $A_1 (-1, 2, -3), A_2 (4, -1, 0), A_3 (2, 1, -2), A_4 (3, 4, 5)$.
 6.19. $A_1 (4, -1, 3), A_2 (-2, 1, 0), A_3 (0, -5, 1), A_4 (3, 2, -6)$.
 6.20. $A_1 (1, -1, 1), A_2 (-2, 0, 3), A_3 (2, 1, -1), A_4 (2, -2, -4)$.
 6.21. $A_1 (1, 2, 0), A_2 (1, -1, 2), A_3 (0, 1, -1), A_4 (-3, 0, 1)$.
 6.22. $A_1 (1, 0, 2), A_2 (1, 2, -1), A_3 (2, -2, 1), A_4 (2, 1, 0)$.
 6.23. $A_1 (1, 2, -3), A_2 (1, 0, 1), A_3 (-2, -1, 6), A_4 (0, -5, -4)$.
 6.24. $A_1 (3, 10, -1), A_2 (-2, 3, -5), A_3 (-6, 0, -3), A_4 (1, -1, 2)$.
 6.25. $A_1 (-1, 2, 4), A_2 (-1, -2, -4), A_3 (3, 0, -1), A_4 (7, -3, 1)$.
 6.26. $A_1 (0, -3, 1), A_2 (-4, 1, 2), A_3 (2, -1, 5), A_4 (3, 1, -4)$.

Task 7. Find the distance from the point M_0 to the plane passing through the points M_1, M_2, M_3 .

- 7.1. $M_1 (-3, 4, -7), M_2 (1, 5, -4), M_3 (-5, -2, 0), M_0 (-12, 7, -1)$.
 7.2. $M_1 (-1, 2, -3), M_2 (4, -1, 0), M_3 (2, 1, -2), M_0 (1, -6, -5)$.
 7.3. $M_1 (-3, -1, 1), M_2 (-9, 1, -2), M_3 (3, -5, 4), M_0 (-7, 0, -1)$.
 7.4. $M_1 (1, -1, 1), M_2 (-2, 0, 3), M_3 (2, 1, -1), M_0 (-2, 4, 2)$.
 7.5. $M_1 (1, 2, 0), M_2 (1, -1, 2), M_3 (0, 1, -1), M_0 (2, -1, 4)$.
 7.6. $M_1 (1, 0, 2), M_2 (1, 2, -1), M_3 (2, -2, 1), M_0 (-5, -9, 1)$.
 7.7. $M_1 (1, 2, -3), M_2 (1, 0, 1), M_3 (-2, -1, 6), M_0 (3, -2, -9)$.
 7.8. $M_1 (3, 10, -1), M_2 (-2, 3, -5), M_3 (-6, 0, -3), M_0 (-6, 7, -10)$.
 7.9. $M_1 (-1, 2, 4), M_2 (-1, -2, -4), M_3 (3, 0, -1), M_0 (-2, 3, 5)$.
 7.10. $M_1 (0, -3, 1), M_2 (-4, 1, 2), M_3 (2, -1, 5), M_0 (-3, 4, -5)$.
 7.11. $M_1 (1, 3, 0), M_2 (4, -1, 2), M_3 (3, 0, 1), M_0 (4, 3, 0)$.
 7.12. $M_1 (-2, -1, -1), M_2 (0, 3, 2), M_3 (3, 1, -4), M_0 (-21, 20, -16)$.
 7.13. $M_1 (-3, -5, 6), M_2 (2, 1, -4), M_3 (0, -3, -1), M_0 (3, 6, 68)$.
 7.14. $M_1 (2, -4, -3), M_2 (5, -6, 0), M_3 (-1, 3, -3), M_0 (2, -10, 8)$.
 7.15. $M_1 (1, -1, 2), M_2 (2, 1, 2), M_3 (1, 1, 4), M_0 (-3, 2, 7)$.
 7.16. $M_1 (1, 3, 6), M_2 (2, 2, 1), M_3 (-1, 0, 1), M_0 (5, -4, 5)$.
 7.17. $M_1 (-4, 2, 6), M_2 (2, -3, 0), M_3 (-10, 5, 8), M_0 (-12, 1, 8)$.
 7.18. $M_1 (7, 2, 4), M_2 (7, -1, -2), M_3 (-5, -2, -1), M_0 (10, 1, 8)$.
 7.19. $M_1 (2, 1, 4), M_2 (3, 5, -2), M_3 (-7, -3, 2), M_0 (-3, 1, 8)$.
 7.20. $M_1 (-1, -5, 2), M_2 (-6, 0, -3), M_3 (3, 6, -3), M_0 (10, -8, -7)$.
 7.21. $M_1 (0, -1, -1), M_2 (-2, 3, 5), M_3 (1, -5, -9), M_0 (-4, -13, 6)$.
 7.22. $M_1 (5, 2, 0), M_2 (2, 5, 0), M_3 (1, 2, 4), M_0 (-3, -6, -8)$.
 7.23. $M_1 (2, -1, -2), M_2 (1, 2, 1), M_3 (5, 0, -6), M_0 (14, -3, 7)$.
 7.24. $M_1 (-2, 0, -4), M_2 (-1, 7, 1), M_3 (4, -8, -4), M_0 (-6, 5, 5)$.
 7.25. $M_1 (14, 4, 5), M_2 (-5, -3, 2), M_3 (-2, -6, -3), M_0 (-1, -8, 7)$.
 7.26. $M_1 (1, 2, 0), M_2 (3, 0, -3), M_3 (5, 2, 6), M_0 (-13, -8, 16)$.

Task 8. Find the equation of the plane passing through the point M_0 perpendicular to the vector \overline{BC} .

- 8.1. $A (1, 0, -2), B (2, -1, 3), C (0, -3, 2)$.
 8.2. $A (-1, 3, 4), B (-1, 5, 0), C (2, 6, 1)$.
 8.3. $A (4, -2, 0), B (1, -1, -5), C (-2, 1, -3)$.
 8.4. $A (-8, 0, 7), B (-3, 2, 4), C (-1, 4, 5)$.
 8.5. $A (7, -5, 1), B (5, -1, -3), C (3, 0, -4)$.

- 8.6. $A(-3, 5, -2), B(-4, 0, 3), C(-3, 2, 5)$.
 8.7. $A(1, -1, 8), B(-4, -3, 10), C(-1, -1, 7)$.
 8.8. $A(-2, 0, -5), B(2, 7, -3), C(1, 10, -1)$.
 8.9. $A(1, 9, -4), B(5, 7, 1), C(3, 5, 0)$.
 8.10. $A(-7, 0, 3), B(1, -5, -4), C(2, -3, 0)$.
 8.11. $A(0, -3, 5), B(-7, 2, 6), C(-3, 2, 4)$.
 8.12. $A(5, -1, 2), B(2, -4, 3), C(4, -1, 3)$.
 8.13. $A(-3, 7, 2), B(3, 5, 1), C(4, 5, 3)$.
 8.14. $A(0, -2, 8), B(4, 3, 2), C(1, 4, 3)$.
 8.15. $A(1, -1, 5), B(0, 7, 8), C(-1, 3, 8)$.
 8.16. $A(-10, 0, 9), B(12, 4, 11), C(8, 5, 15)$.
 8.17. $A(3, -3, -6), B(1, 9, -5), C(6, 6, -4)$.
 8.18. $A(2, 1, 7), B(9, 0, 2), C(9, 2, 3)$.
 8.19. $A(-7, 1, -4), B(8, 11, -3), C(9, 9, -1)$.
 8.20. $A(1, 0, -6), B(-7, 2, 1), C(-9, 6, 1)$.
 8.21. $A(-3, 1, 0), B(6, 3, 3), C(9, 4, -2)$.
 8.22. $A(-4, -2, 5), B(3, -3, -7), C(9, 3, -7)$.
 8.23. $A(0, -8, 10), B(-5, 5, 7), C(-8, 0, 4)$.
 8.24. $A(1, -5, -2), B(6, -2, 1), C(2, -2, -2)$.

Task 9. Find the angle between the planes.

- 9.1. $x - 3y + 5z = 0, 2x - y + 5z - 16 = 0$.
 9.2. $x - 3y + z - 1 = 0, x + z - 1 = 0$.
 9.3. $4x - 5y + 3z - 1 = 0, x - 4y - z + 9 = 0$.
 9.4. $3x - y + 2z + 15 = 0, 5x + 9y - 3z - 1 = 0$.
 9.5. $6x + 2y - 4z + 17 = 0, 9x + 3y - 6z - 4 = 0$.
 9.6. $x - y\sqrt{2} + z - 1 = 0, x + y\sqrt{2} - z + 3 = 0$.
 9.7. $3y - z = 0, 2y + z = 0$.
 9.8. $6x + 3y - 2z = 0, x + 2y + 6z - 12 = 0$.
 9.9. $x + 2y + 2z - 3 = 0, 16x + 12y - 15z - 1 = 0$.
 9.10. $2x - y + 5z + 16 = 0, x + 2y + 3z + 8 = 0$.
 9.11. $2x + 2y + z - 1 = 0, x + z - 1 = 0$.
 9.12. $3x + y + z - 4 = 0, y + z + 5 = 0$.
 9.13. $3x - 2y - 2z - 16 = 0, x + y - 3z - 7 = 0$.
 9.14. $2x + 2y + z + 9 = 0, x - y + 3z - 1 = 0$.
 9.15. $x + 2y + 2z - 3 = 0, 2x - y + 2z + 5 = 0$.

9.16. $3x+2y-3z-1=0, x+y+z-7=0.$

9.17. $x-3y-2z-8=0, x+y-z+3=0.$

9.18. $3x-2y+3z+23=0, y+z+5=0.$

9.19. $x+y+3z-7=0, y+z-1=0.$

9.20. $x-2y+2z+17=0, x-2y-1=0.$

9.21. $x+2y-1=0, x+y+6=0.$

9.22. $2x-z+5=0, 2x+3y-7=0.$

9.23. $5x+3y+z-18=0, 2y+z-9=0.$

9.24. $4x+3z-2=0, x+2y+2z+5=0.$

9.25. $x+4y-z+1=0, 2x+y+4z-3=0.$

Task 10. Solve the problems related to a straight line in the plane:

10.1. A triangle ABC is given by the vertices $A (-2; 3), B (4; 1), C (6; -5)$. Find the equation of the median passing through the vertex A .

10.2. The vertices of the triangle are $A (4; 6), B (-4,0), C (-1, -4)$. Find the equation of the altitude dropped from the vertex A on the side BC .

10.3. Find the equation of the straight line passing through the point of intersection of the straight lines $5x-y+10=0$ and $8x+4y+9=0$, and which is parallel to the straight line given by $x+3y=0$.

10.4. With known equations of the straight lines coinciding with the two sides of the parallelogram: $x-3y=0$ and $2x+5y+6=0$, and given its vertex $C (4, -1)$, find the equations of the straight lines coinciding with the other sides of the parallelogram

10.5. Given the middle points of the sides of a triangle $M_1 (2,3), M_2 (-1,2), M_3 (4,5)$. Find the equation of the triangle sides.

10.6. The straight line is given by $2x+3y+4=0$. Find an equation of the straight line passing through the point $M (2, 1)$ at the angle 45° to the given straight line.

10.7. The vertices of the triangle ABC are $A (-4; 2), B (2; -5), C (5,0)$. Find the equation of the altitude dropped from the vertex C .

10.8. Find the equation of the straight line parallel to the other two straight lines $x+y-1=0, x+y-13=0$ and which has the same distances from each of them.

10.9. The vertices of the triangle ABC are $A (-6,3), B (1,5)$ and $C (-2,0)$. Find the equation of the straight line passing through the vertex B parallel to the

side AC.

10.10. The vertices of the triangle ABC are A (-1; 2), B (3; 1), C (4; -2). Find the equation of the altitude dropped from the vertex A.

10.11. The vertices of the triangle ABC are A (-1, 2), B (3, -1) and C (0,4). Find the equation of the straight line passing through the vertex A parallel to the side BC.

10.12. Find the area of the square if its two sides coincide with the straight lines: $3x-2y+3=0$, $6x-4y+5=0$.

10.13. Find a point A symmetric to B (1, -3) with respect to the straight line $x+2y-5=0$.

10.14. Two sides of the parallelogram coincide with the straight lines $x-y-1=0$, $x-2y-10=0$ and the diagonals intersect at the point M (3, -1). Find the equations of the straight lines coinciding with the other two sides of the parallelogram.

10.15. Find the angle between two straight lines: $4x+6y+5=0$ and $5x-15y-7=0$.

10.16. Find the point symmetrical to the point P (-2,9) with respect to the straight line $x-y+9=0$.

10.17. The straight line $2x+3y-6=0$ coincides with a side of the rectangle and an intersection point of the diagonals of the rectangle is M (5, 7). Find the straight lines coinciding with the other sides of the rectangle if one of them is passing through the point B (2,1).

10.18. Find the point symmetrical to the point P (-2,9), with respect to the straight line $2x-3y+18=0$.

10.19. The straight lines $x+y=4$; $3x-2y=12$; $2x-y=1$ coincide with the sides of a triangle. Find the area of this triangle.

10.20. Скласти рівняння прямої, що проходить через точку перетину прямих: $5x-y+10=0$, $8x+4y+9=0$ і паралельної прямої: $x+3y=0$.

10.21. Find an inner corner of the triangle whose sides are composed by the straight lines: $3x-y-6=0$; $x-y+4=0$; $x+2y=0$.

10.22. Two points are P (2; 3), Q (-1; 0) Find the equation of the straight line passing through the point Q perpendicular to the segment PQ.

10.23. Find the angle between two straight lines: $x+y-2=0$, $6x-6y+1=0$.

10.24. Find the projection of the point P (1, -3/2) on the straight line $2x-3y+$

$$5 = 0.$$

10.25. The vertices of the triangle ABC are A (-2; 0), B (2; 4), C (4; 0). Find the equation of the median dropped from the vertex A.

Task 12. Find the canonical equation of the straight line in the space.

12.1. $2x + y + z - 2 = 0, 2x - y - 3z + 6 = 0.$

12.2. $x - 3y + 2z + 2 = 0, x + 3y + z + 14 = 0.$

12.3. $x - 2y + z - 4 = 0, 2x + 2y - z - 8 = 0.$

12.4. $x + y + z - 2 = 0, x - y - 2z + 2 = 0.$

12.5. $2x + 3y + z + 6 = 0, x - 3y - 2z + 3 = 0.$

12.6. $3x + y - z - 6 = 0, 3x - y + 2z = 0.$

12.7. $x + 5y + 2z + 11 = 0, x - y - z - 1 = 0.$

12.8. $3x + 4y - 2z + 1 = 0, 2x - 4y + 3z + 4 = 0.$

12.9. $5x + y - 3z + 4 = 0, x - y + 2z + 2 = 0.$

12.10. $x - y - z - 2 = 0, x - 2y + z + 4 = 0.$

12.11. $4x + y - 3z + 2 = 0, 2x - y + z - 8 = 0.$

12.12. $3x + 3y - 2z - 1 = 0, 2x - 3y + z + 6 = 0.$

12.13. $6x - 7y - 4z - 2 = 0, x + 7y - z - 5 = 0.$

12.14. $8x - y - 3z - 1 = 0, x + y + z + 10 = 0.$

12.15. $6x - 5y - 4z + 8 = 0, 6x + 5y + 3z + 4 = 0.$

12.16. $x + 5y - z - 5 = 0, 2x - 5y + 2z + 5 = 0.$

12.17. $2x - 3y + z + 6 = 0, x - 3y - 2z + 3 = 0.$

12.18. $5x + y + 2z + 4 = 0, x - y - 3z + 2 = 0.$

12.19. $4x + y + z + 2 = 0, 2x - y - 3z - 8 = 0.$

12.20. $2x + y - 3z - 2 = 0, 2x - y + z + 6 = 0.$

12.21. $x + y - 2z - 2 = 0, x - y + z + 2 = 0.$

12.22. $x + 5y - z + 11 = 0, x - y + 2z - 1 = 0.$

12.23. $x - y + z - 2 = 0, x - 2y - z + 4 = 0.$

12.24. $6x - 7y - z - 2 = 0, x + 7y - 4z - 5 = 0.$

12.25. $x + 5y + 2z - 5 = 0, 2x - 5y - z + 5 = 0.$

Task 13. Find the point of intersection of a line and a plane.

- 13.1. $\frac{x-2}{-1} = \frac{y-3}{-1} = \frac{z+1}{4}$, $x+2y+3z-14=0$.
- 13.2. $\frac{x+1}{3} = \frac{y-3}{-4} = \frac{z+1}{5}$, $x+2y-5z+20=0$.
- 13.3. $\frac{x-1}{-1} = \frac{y+5}{4} = \frac{z-1}{2}$, $x-3y+7z-24=0$.
- 13.4. $\frac{x-1}{1} = \frac{y}{0} = \frac{z+3}{2}$, $2x-y+4z=0$.
- 13.5. $\frac{x-5}{1} = \frac{y-3}{-1} = \frac{z-2}{0}$, $3x+y-5z-12=0$.
- 13.6. $\frac{x+1}{-3} = \frac{y+2}{2} = \frac{z-3}{-2}$, $x+3y-5z+9=0$.
- 13.7. $\frac{x-1}{-2} = \frac{y-2}{1} = \frac{z+1}{-1}$, $x-2y+5z+17=0$.
- 13.8. $\frac{x-1}{2} = \frac{y-2}{0} = \frac{z-4}{1}$, $x-2y+4z-19=0$.
- 13.9. $\frac{x+2}{-1} = \frac{y-1}{1} = \frac{z+4}{-1}$, $2x-y+3z+23=0$.
- 13.10. $\frac{x+2}{1} = \frac{y-2}{0} = \frac{z+3}{0}$, $2x-3y-5z-7=0$.
- 13.11. $\frac{x-1}{2} = \frac{y-1}{-1} = \frac{z+2}{3}$, $4x+2y-z-11=0$.
- 13.12. $\frac{x-1}{1} = \frac{y+1}{0} = \frac{z-1}{-1}$, $3x-2y-4z-8=0$.
- 13.13. $\frac{x+2}{-1} = \frac{y-1}{1} = \frac{z+3}{2}$, $x+2y-z-2=0$.
- 13.14. $\frac{x+3}{1} = \frac{y-2}{-5} = \frac{z+2}{3}$, $5x-y+4z+3=0$.
- 13.15. $\frac{x-2}{2} = \frac{y-2}{-1} = \frac{z-4}{3}$, $x+3y+5z-42=0$.
- 13.16. $\frac{x-3}{-1} = \frac{y-4}{5} = \frac{z-4}{2}$, $7x+y+4z-47=0$.
- 13.17. $\frac{x+3}{2} = \frac{y-1}{3} = \frac{z-1}{5}$, $2x+3y+7z-52=0$.
- 13.18. $\frac{x-3}{2} = \frac{y+1}{3} = \frac{z+3}{2}$, $3x+4y+7z-16=0$.

$$13.19. \frac{x-5}{-2} = \frac{y-2}{0} = \frac{z+4}{-1}, 2x-5y+4z+24=0.$$

$$13.20. \frac{x-1}{8} = \frac{y-8}{-5} = \frac{z+5}{12}, x-2y-3z+18=0.$$

$$13.21. \frac{x-3}{1} = \frac{y-1}{-1} = \frac{z+5}{0}, x+7y+3z+11=0.$$

$$13.22. \frac{x-5}{-1} = \frac{y+3}{5} = \frac{z-1}{2}, 3x+7y-5z-11=0.$$

$$13.23. \frac{x-1}{7} = \frac{y-2}{1} = \frac{z-6}{-1}, 4x+y-6z-5=0.$$

$$13.24. \frac{x-3}{1} = \frac{y+2}{-1} = \frac{z-8}{0}, 5x+9y+4z-25=0.$$

$$13.25. \frac{x+1}{-2} = \frac{y}{0} = \frac{z+1}{3}, x+4y+13z-23=0.$$

$$13.26. \frac{x-1}{6} = \frac{y-3}{1} = \frac{z+5}{3}, 3x-2y+5z-3=0.$$

Task 14. Find the point M_1 , symmetric to the point M with respect to the line (for tasks 1 -15) or to the plane (for tasks 16 - 31).

- 14.1. $M(0, -3, -2), \frac{x-1}{1} = \frac{y+1,5}{-1} = \frac{z}{1}$.
- 14.2. $M(2, -1, 1), \frac{x-4,5}{1} = \frac{y+3}{-0,5} = \frac{z-2}{1}$.
- 14.3. $M(1, 1, 1), \frac{x-2}{1} = \frac{y+1,5}{-2} = \frac{z-1}{1}$.
- 14.4. $M(1, 2, 3), \frac{x-0,5}{0} = \frac{y+1,5}{-1} = \frac{z-1,5}{1}$.
- 14.5. $M(1, 0, -1), \frac{x-3,5}{2} = \frac{y-1,5}{2} = \frac{z}{0}$.
- 14.6. $M(2, 1, 0), \frac{x-2}{0} = \frac{y+1,5}{-1} = \frac{z+0,5}{1}$.
- 14.7. $M(-2, -3, 0), \frac{x+0,5}{1} = \frac{y+1,5}{0} = \frac{z-0,5}{1}$.
- 14.8. $M(-1, 0, -1), \frac{x}{-1} = \frac{y-1,5}{0} = \frac{z-2}{1}$.
- 14.9. $M(0, 2, 1), \frac{x-1,5}{2} = \frac{y}{-1} = \frac{z-2}{1}$.
- 14.10. $M(3, -3, -1), \frac{x-6}{5} = \frac{y-3,5}{4} = \frac{z+0,5}{0}$.
- 14.11. $M(3, 3, 3), \frac{x-1}{-1} = \frac{y-1,5}{0} = \frac{z-3}{1}$.
- 14.12. $M(-1, 2, 0), \frac{x+0,5}{1} = \frac{y+0,7}{-0,2} = \frac{z-2}{2}$.
- 14.13. $M(2, -2, -3), \frac{x-1}{-1} = \frac{y+0,5}{0} = \frac{z+1,5}{0}$.
- 14.14. $M(-1, 0, 1), \frac{x+0,5}{0} = \frac{y-1}{0} = \frac{z-4}{2}$.
- 14.15. $M(0, -3, -2), \frac{x-0,5}{0} = \frac{y+1,5}{-1} = \frac{z-1,5}{1}$.
- 14.16. $M(1, 0, 1), 4x+6y+4z-25=0$.
- 14.17. $M(-1, 0, -1), 2x+6y-2z+11=0$.
- 14.18. $M(0, 2, 1), 2x+4y-3=0$.

14.19. $M(2, 1, 0), y+z+2=0.$

14.20. $M(-1, 2, 0), 4x-5y-z-7=0.$

14.21. $M(2, -1, 1), x-y+2z-2=0.$

14.22. $M(1, 1, 1), x+4y+3z+5=0.$

14.23. $M(1, 2, 3), 2x+10y+10z-1=0.$

14.24. $M(0, -3, -2), 2x+10y+10z-1=0$

14.25. $M(1, 0, -1), 2y+4z-1=0.$

14.26. $M(3, -3, -1), 2x-4y-4z-13=0.$

Task 15. Reduce the equation of a line to the canonical form, draw this line and find, depending on the result:

- the coordinates of the center of the circle and its radius;
- the coordinates of the foci, the length of the semi-axes and the eccentricity of the ellipse;
- the coordinates of the foci, the length of the semi-axes and the eccentricity of the hyperbola and the equation of its asymptote;
- the coordinates of the vertex and focus of the parabola, the value of the parameter, as well as the equation of its directrix

15.1 $x^2 + y^2 + 10x - 6y + 25 = 0$

15.2 $4x^2 + y^2 + 2x - 14y + 14 = 0$

15.3 $5x^2 - 4y^2 + 16y - 36 = 0$

15.4 $4x^2 + 3y^2 + 18y + 15 = 0$

15.5 $y^2 + 2x - 10y + 31 = 0$

15.6 $x^2 - 2x + y = 0$

15.7 $x^2 - 4y^2 - 4x - 8y - 36 = 0$

15.8 $x^2 + y^2 - 2x + 6y + 1 = 0$

15.9 $4x - 3y^2 + 12y - 12 = 0$

15.10 $x^2 - 10x + y + 29 = 0$

15.11 $9x^2 - 4y^2 + 30x - 12y - 2 = 0$

15.12 $x^2 - y^2 - 4x + 2y + 7 = 0$

15.13 $3x^2 + 2y^2 - 6x - 12y - 9 = 0$

15.14 $x^2 - 2y^2 + 4y - 12 = 0$

15.15 $9x^2 + 4y^2 + 6x - 12y + 9 = 0$

15.16 $3x^2 + 3y^2 - 6x + 8y = 0$

15.17 $x^2 + 2x + 4y - 7 = 0$

15.18 $4x^2 - 8x + y + 7 = 0$

15.19 $9x^2 + 16y^2 - 90x + 32y + 97 = 0$

15.20 $x^2 + 4y^2 - 4x + 8y - 28 = 0$

15.21 $4x^2 - y^2 - 8x - 6y - 25 = 0$

15.22 $x^2 + y^2 + 4x - 5 = 0$

15.23 $4x^2 + 3y^2 - 8x + 12y - 32 = 0$

15.24 $9x^2 - 16y^2 + 90x + 32y - 367 = 0$

15.25 $y^2 - 2x + 4y + 2 = 0$

15.26 $9x^2 - 16y^2 - 18x + 32y + 137 = 0$

15.27 $9x^2 + 4y^2 + 6x - 12y + 9 = 0$

15.28 $x^2 + y^2 - 2x + 6y + 1 = 0$

15.29 $4x^2 - y^2 - 8x - 6y - 25 = 0$

15.30 $4x^2 - 8x + y + 7 = 0$

15.31 $9x^2 - 16y^2 + 90x + 32y - 367 = 0$