# Faculty of Mechanics and Mathematics

# Department of Mathematics

**Conclusion on the subject "Linear algebra and analytical geometry"**

**exam**

**PROGRAM**

**(Fall semester, 2023/2024)**

**Almaty 2023 г.**

**DEVELOPED BY:**

Sautbekova M.S., Ph.D., senior lecturer

CONSIDERED AND APPROVED at the meeting of the department.

2023, protocol no.

**Introduction**

**Exam form.** Oral exam - according to the exam schedule, the student passes the exam by filling in the answer fields of the automatically generated exam ticket, and then by defending it orally. The exam is supervised by a lecturer.

**Start of the exam:** date and time of the exam schedule.

**End of the exam**: 3 hours after the start of the exam (exact time will be displayed).

Tickets are generated automatically.

**How works are checked**

1. The student defends the completed exam papers to one of the committee members.

2. The commission member evaluates the work.

3. Copies the price to the Univer system list.

**The highest score is 100 points.**

**Main topics of the course**

1. Space of matrices
2. Abelian group of matrices
3. Laws of superposition
4. Scalar multiplication
5. Tensor multiplication
6. Right and left spaces
7. Step matrix
8. Elementary transformations
9. Gauss method
10. Main and empty variables
11. Personal decision
12. General decision
13. Fundamental decision
14. Terms of reference
15. Properties of the detector
16. Stepped matrix determinant
17. Inverted matrix determinant
18. The concept of rank
19. Rank theorem
20. Relationship of rank with addition operation
21. The relationship between rank and multiplication
22. Kronecker Capelli theorem
23. Kramer's rule
24. Inverse matrix
25. Allied matrix
26. Inverse matrix formula
27. Vector space axiomsВекторлардың сызықтық комбинациясы
28. Basis and measure
29. Coordinates of vectors
30. Migration matrix
31. The formula for changing coordinates of vectors
32. Linear transformations
33. Image and core
34. Linear transformation matrix
35. Change formula
36. Invariant subspaces
37. Factor spaces
38. Kelly Hamilton theorem
39. Minimal polynomial
40. Classification of space
41. Box vector
42. Eigenvalue
43. Descriptive polynomial
44. Jordan cell
45. Jordan matrix
46. Finding the Jordan matrix
47. Equations of lines in the plane
48. Interposition of linesБағыттаушы және нормаль векторлар
49. 1. Equation of planes in space
50. 2. Vector multiplication
51. 3. Interposition of line and plane
52. 4. Mutual arrangement of two planes
53. 5. Distance from point to plane
54. 6. Canonical equation of ellipse
55. 7. Canonical equation of hyperbola
56. 8. Canonical equation of the parabola
57. 9. The general equation of the second order curve
58. 10. Similarity of parabolas
59. 11. Eccentricity
60. 12. Similarity of ellipses
61. 13. Similarity of hyperbolas
62. 14. Classification of curves by eccentricity
63. 15. Secondary pages
64. 16. Cone
65. 17. Ellipsoid
66. 18. Parabaloid
67. 19. Two-cavity and one-cavity hyperboloid
68. 20. Cylindrical surfaces
69. 21. Invariants of second-order curves
70. 22. Invariants of second-order surfaces
71. Director
72. Focuses
73. Semi-axes
74. The area of ​​the ellipse
75. Focal properties of second-order curves
76. Taking second-order curves as sections
77. Simplification
78. Turning and moving

## Main literature:

1. Бадаев С.А., Сызықтық алгебра мен аналитикалық геометрия. Оқуқұралы, 1 бөлім. – Алматы, Қазақ университеті, 2002, 232 бет.

2. Бадаев С.А., Сызықтық алгебра мен аналитикалық геометрия. Оқуқұралы, 2 бөлім.– Алматы, Қазақуниверситеті, 2002, 94 бет.

3. Курош А.Г. Курс высшей алгебры. – М.: Наука, 1978.

4. П.С. Александров «Лекции по аналитической геометрии»

5. Проскуряков И.В. Сборник задач по линейной алгебре. – М.: Наука, 1978.

6. Фадеев Д.К., Соминский И.С. Сборник задач по высшей алгебре. – М.: Наука, 1982.

7. Моденов П.С., Пархоменко А.С. Сборник задач по аналитической геометрии. – М.: Изд-во МГУ, 1979.

8. Цубербиллер О.Н., Задачи и упражнения по аналитической геометрии. – М.: Наука, 1970.

## Қосымша әдебиеттер:

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| 9. Кострикин А.И. Введение в алгебру, т.1. Основы алгебры,т.2 Линейная алгебра, т.3 Основные алгебраические структуры. – М.: Физматгиз, 2001.  10. Мальцев А.И., Основы линейной алгебры. – М.: Наука, 1970.  11. Кострикин А.И., Сборник задач по алгебре. – М.: Физматлит., 2001.  12. Базылев В.Т., Дуничев К.И., Иваницкая В.А., Геометрия. I. – М.: Просвещение, 1974.  13. Моденов П.С., Аналитическая геометрия. – М.: Изд-во МГУ, 1969. |

Математика кафедрасы мәжілісінде қарастырылды және ұсынылды

«\_\_\_\_» \_\_\_\_\_\_\_\_\_\_\_\_\_ 2023 ж., №\_\_\_ хаттама

Математика кафедрасының меңгерушісі \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ Қ.Б. Иманбердиев

(қолы)

### Факультеттің академиялық комитеті мәжілісінде ұсынылды

«\_\_\_\_» \_\_\_\_\_\_\_\_\_\_\_\_\_ 2023 ж., №\_\_\_ хаттама

Механика-математика факультетінің

әдістемелік бюросының төрайымы\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

(қолы)