

INDEX

(The numbers refer to the pages.)

- Abelian group, 83.
- Adjoint of a determinant, 30;
 - of a matrix, 77, 80;
 - of a quadratic form, 159.
- Affine transformation, 70.
- Algebraic complement, 23
- Anharmonic ratio, 103.
- Associative law for matrices, 64.
- Augmented matrix, 44.
- Axis coördinates, 113.

- Bézout's method of elimination, 238.
- Bilinear forms, 114-117;
 - determinant, matrix, rank of, 114;
 - equivalence of, 116, 283;
 - normal forms of, 116, 288, 289;
 - pairs of, 283, 287-292;
 - reducibility of, 116;
 - singular, 114.
- Binary forms, 5;
 - biquadratic, 260;
 - cubic, 239;
 - discriminant of, 237;
 - factors of, 188;
 - invariants of, 235;
 - resultant of, 201, 236, 239;
 - symmetric functions, 255.
- Biquadratic, binary, 260.
- Boole, 260.
- Bordered determinants, 28, 156-160.
- Bromwich, 270, 312-315.

- Cancellation, 7.
- Category of pairs of bilinear forms, 287;
 - of collineations, 293;
 - of pairs of quadratic forms, 305.
- Cayley, 63, 154, 260, 296.
- Characteristic equation, function, matrix, 282.
- Characteristic of a quadratic form, 149;
 - of a collineation, 293;
 - of a pair of bilinear forms, 287;
 - of a pair of quadratic forms, 305.
- Class of objects, 81;
 - of quadratic forms, 148.

- Cofactor, 23.
- Cogredient variables, 90.
- Collineation, 68, 284, 292.
- Combinant, 115.
- Commutative group, 83;
 - law for matrices, 63.
- Complement of a minor, 23.
- Complete system of invariants, 93.
- Complex quantity, 8, 60.
- Component of complex quantity, 61.
- Composite elementary divisors, 270.
- Concomitants, 109.
- Cone, 120-123, 156.
- Conjugate of a matrix, 21, 65, 80;
 - planes, 158;
 - points, 121.
- Continuity, 14.
- Contragredient variables, 108.
- Contravariant, 109.
- Coördinates, homogeneous, 11;
 - point, plane, line (axis, ray), 107-113.
- Correlation, 117.
- Corresponding polynomials, 178.
- Covariant, absolute, 91;
 - integral rational, 99;
 - relative, 97.
- Cramer's Rule, 43.
- Cross-ratio, 103, 107.
- Cubic, binary, 239.
- Cyclic group, 87.

- Definite quadratic form, 150.
- Degree of a polynomial, 1, 4;
 - of a λ -matrix, 277;
 - of a product, 6, 277.
- Descriptive property, 88, 282.
- Determinant, 20;
 - adjoint of, 30;
 - bordered, 28, 156-160;
 - Laplace's development of, 26;
 - matrix of, 21;
 - minors of, 22;
 - of a bilinear form, 114;
 - of a matrix, 21;
 - of a transformation, 66;
 - orthogonal, 154;

- Determinant—*Continued.*
 product of two, 26;
 rank of, 22;
 skew-symmetric, 59;
 symmetric, 56.
- Discriminant of a binary biquadratic, 260;
 of a binary cubic, 239;
 of a binary form, 237, 259;
 of a polynomial in one variable, 250;
 of a quadratic form, 128;
 of a quadric surface, 118.
- Division of polynomials, 180;
 of λ -matrices, 278;
 of matrices, 75.
- Divisor of zero, 65, 80.
- Domain of rationality, 175, 212, 216.
- Dyad (dyadic polynomial), 79.
- Dyalitic method of elimination, 199.
- Element of a determinant or matrix, 20;
 of a set, system, or group, 81.
- Elementary divisors of a λ -matrix, 271;
 of a collineation, 286;
 of a pair of bilinear forms, 284;
 of a pair of quadratic forms, 303;
 simple, composite, 270.
- Elementary symmetric function, 242, 253.
- Elementary transformation of a matrix, 55;
 of a λ -matrix, 262.
- Elimination, 198, 217, 238.
- Equations, linear, 43;
 homogeneous, linear, 47;
 quadratic, 149;
 quadratic, pairs of, 307;
 quadratic, pencils of, 312.
- Equianharmonic points, 107.
- Equivalence, 92.
- Equivalent matrices, 55, 93;
 collineations, 286;
 λ -matrices, 263, 274;
 pairs of bilinear forms, 283;
 pairs of matrices, 281;
 pairs of quadratic forms, 170, 303;
 quadratic forms, 135, 148.
- Euclid's algorithm, 189, 192, 206.
- Euler's theorem for homogeneous functions, 237.
- Factors of a polynomial, 174, 187, 203; see *invariant factors.*
- Fixed points of a collineation, 285;
 lines, planes of a collineation, 286.
- Forms, 4; see *bilinear, quadratic, binary forms*;
 biquadratic, 260;
 cubic, 239;
 polar, 127.
- Fours group, 87.
- Fractional matrices, 86.
- Frobenius, 262, 270.
- Fundamental system of solutions, 49;
 theorem of algebra, 16.
- Generator of a quadric surface, 119.
- Gibbs, 79.
- Greatest common divisor of integers, 188;
 of polynomials in one variable, 191, 197;
 of polynomials in two variables, 206.
- Ground-form, 96.
- Group, 80;
 Abelian or commutative, 83;
 cyclic, 87;
 fours group, 87;
 isomorphic, 83;
 sub-, 83.
- Group property, 82.
- Hamilton, 79, 296.
- Harmonic division, 104.
- Homogeneity, principle of, 226.
- Homogeneous coördinates, 11;
 invariants, 230;
 linear equations, 47, 49;
 polynomials, 4.
- Idemfactor, 74.
- Identical vanishing (equality) of polynomials, 2, 5, 7, 10;
 element of a group, 82;
 transformation, 67.
- Indefinite quadratic form, 150.
- Index of inertia of quadratic form, 146.
- Invariant, absolute algebraic, 89;
 arithmetical, 91, 94, 115, 124, 129, 146, 287;
 complete system of, 93;
 geometric, 88, 103;
 homogeneous, 230;
 integral rational, 99, 101, 115, 129, 137, 159, 166, 218, 259, 260;
 irrational, 167, 259, 260;
 rational, 96, 222; see also *integral, rational*;
 relative algebraic, 96, 115; see *integral rational.*
- Invariant factors of a λ -matrix, 269;
 of a collineation, 286;
 of a pair of bilinear forms, 284;
 of a pair of quadratic forms, 303.
- Inverse of a transformation, 67;
 of an element of a group, 82;
 of a matrix, 75, 80;
 of a quadratic form, 160.
- Isobaric polynomial, 222;
 symmetric function, 245, 255, 256.
- Isomorphic groups, 83.

- Jacobi, 144.
- Kronecker, 4, 139, 262, 314.
- λ -equation of two conics, 164;
 of two quadratic forms, 166.
- λ -matrix, 262.
- Lagrange's reduction, 131.
- Laplace's development, 26.
- Law of Inertia, 144;
 of Nullity, 78, 80.
- Line at infinity, 13.
- Line-coördinates, 108, 110.
- Linear dependence, conditions for, 36-38;
 of geometric configurations, 39;
 of polynomials, 35, 38;
 of sets of constants, 35, 48.
- Linear equations, 43, 47, 49;
 transformations, 66.
- Linear factors of polynomials in one variable, 187;
 of binary forms, 188;
 of λ -matrices, 270.
- Matrix, theory of, 20-22, 54-66, 74-80, 86, 93,
 262-283, 296-302;
 adjoint of, 77, 80;
 as a complex quantity, 60;
 augmented, 44;
 conjugate, 21;
 determinant of, 21;
 division of one by another, 75;
 elementary transformation of, 55;
 equivalent, 55;
 fractional, 86;
 inverse of, 75;
 multiplication by matrix, 63;
 multiplication by scalar, 62;
 normal form of a, 56 (Exercise 3);
 normal form of a symmetrical, 59;
 of a bilinear form, 114;
 of a determinant, 21;
 of a quadratic form, 128;
 of a quadric surface, 118;
 of a system of linear equations, 44;
 of a transformation, 66.
 orthogonal, 154, 302, 304;
 powers of, 75;
 product of two, 63;
 rank of, 22;
 rank of product of two, 77;
 scalar, 76;
 similar, 283;
 singular, 65;
 skew-symmetric, 59;
 sum or difference of two, 62;
- Matrix—*Continued.*
 symmetric, 56;
 transposed, 21;
 unimodular, 83;
 unit, 74.
- Minors of a determinant, 22;
 complementary, 22;
 corresponding, 31;
 principal, 23, 57-59.
- Mixed concomitants, 109.
- Moore, 86.
- Multiplication theorem, 28.
- Multiplicity of roots of an equation, 18;
 of pieces of curves and surfaces, 211, 244.
- Neighborhood of a point, 8, 16, 214.
- Newton's formulæ, 244.
- Normal form of a bilinear form, 116;
 of a binary biquadratic, 261;
 of a binary cubic, 239;
 of a λ -matrix, 267;
 of a matrix, 56 (Exercise 3);
 of a pair of bilinear forms, 289;
 of a pair of quadratic forms, 169, 171, 306;
 of a quadratic form, 135;
 of a quadric surface, 124;
 of a real quadratic form, 148;
 of a symmetrical matrix, 59.
- Nullity, Sylvester's Law of, 78, 80.
- Null-system, 117.
- Order of a determinant or matrix, 20;
 of a group, 87.
- Orthogonal transformation, matrix, determinant, 154, 173, 302, 304.
- Pencil of conics, 163, 312;
 of bilinear forms, 279;
 of quadratic forms, 165, 310.
- Period of an element of a group, 87.
- Plane at infinity, 13;
 conjugate, 158.
- Plane-coördinates, 107.
- Point in space of n dimensions, 9;
 at infinity, 12;
 conjugate, 121;
 equation of a, 107, 108;
 neighborhood of a, 8, 16, 214.
- Polar plane, 122;
 form, 127;
 tetrahedron, 125.
- Pole, 124.
- Polynomial, definition, degree of, etc., 1, 4;
 continuity of a, 14;
 corresponding, 178;
 dyadic, 79;

- Polynomial— *Continued.*
 in a matrix, 296;
 isobaric, 222;
 linear dependence of, 35;
 real, 5;
 roots of a , 18;
 symmetric, 240, 252.
- Prime (relatively) polynomials, 175.
- Principal minors, 23, 57-59.
- Product, degree of, 1, 4;
 of determinants, 26;
 of matrices, 63, 277.
- Projective transformation, 69;
 property, 88, 232.
- Pseudo-tangent lines and planes, 120.
- Quadratic forms, 127;
 adjoint of, 159;
 definite and indefinite, 150;
 invariants of, 129, 137, 146, 159, 165, 303;
 inverse or reciprocal of, 160;
 law of inertia of, 144;
 matrix, discriminant, rank of, 128;
 normal forms of, 135, 148, 169, 171, 306;
 pairs of, 165, 302;
 polar of, 127;
 real, 144;
 reducibility of, 136, 147;
 reduction of, to sum of squares, 131, 139,
 167, 170, 173;
 regularly arranged, 147;
 signature of, 146;
 singular, 128;
 vertex of, 129.
- Quadric surface, matrix, discriminant, rank
 of, 118;
 classification of, 123, 149, 173;
 ruling of, 119;
 singular, 118;
 tangent to, 119, 120, 155.
- Quantic, 4;
 Quaternary form, 5.
- Rank of a matrix or determinant, 22,
 54-59;
 of a bilinear form, 114;
 of a λ -matrix, 262;
 of a quadratic form, 128;
 of a quadric surface, 118;
 of a system of homogeneous linear equa-
 tions, 47;
 of a system of points or linear forms,
 94;
 of the adjoint of a quadratic form, 161;
 of the product of two matrices, 77.
- Rational invariants, 96, 222; see also *in-*
variant, integral, rational;
 of a λ -matrix, 270.

- Rational relation, 244.
- Rationality, domain of, 175, 212, 216.
- Ray coördinates, 113.
- Real polynomials, 5, 174;
 matrix, λ -matrix, elementary transforma-
 tion, 278;
 quadratic forms, 144-154, 161, 170-173.
- Reciprocal or inverse of a quadratic form,
 160.
- Reciprocation, 117.
- Reducibility of a polynomial, 174;
 in a domain, 174, 175;
 of bilinear forms, 116;
 of binary forms, 188;
 of determinants, 176;
 of polynomials in one variable, 187;
 of quadratic forms, 136, 147.
- Regularly arranged quadratic form, 147.
- Resultant of linear forms, 95;
 of two binary forms, 201, 236, 239, 257;
 of two polynomials in one variable, 195,
 239, 248.
- Roots of a polynomial or equation, 18.
- Ruling of a quadric surface, 119.
- S-functions, 241, 253.
- Σ -functions, 240, 252.
- Scalar, 62;
 matrix, 76.
- Self-conjugate tetrahedron, 125;
 triangle, 164.
- Semi-definite quadratic form, 150.
- Set of objects, 80.
- Sgn, 147.
- Signature of a quadratic form, 146.
- Similar matrices, 283.
- Simple elementary divisors, 270.
- Singular matrix, 65;
 bilinear form, 114;
 conic, 163, 272;
 linear transformation, 67;
 quadratic form, 128;
 quadric surface, 118.
- Skew-symmetric determinant, 59;
 bilinear form, 117;
 matrix, 59.
- Smith, H. J. S., 262.
- Subgroup, 83.
- Subresultant, 197.
- Sylvester, 78, 144, 199, 262.
- Symbolic product of bilinear forms, 114.
- Symmetric determinant and matrix, 56,
 299;
 bilinear form, 115;
 binary function, 255;
 polynomial, 240;
 polynomial in pairs of variables, 252;
 ternary function, 257.
- System, 80.

- Tangent lines and planes to quadric surface,
 true and pseudo, 119, 120.
- Ternary form, 5;
 symmetric function, 257.
- Transformation, affine, 70;
 determinant and matrix of, 66;
 elementary (of a matrix), 55, 262;
 identical, 67;
 inverse, 67;
 linear, 66;
 orthogonal, 154, 173, 304;
 projective, 69;
 singular, 67.
- Transposed matrix, 21.
- Unimodular matrix, 83.
- Unit matrix, 74.
- Vertex of a cone, 120, 122, 123, 156;
 of a quadratic form, 129.
- Weierstrass, 262, 270, 314.
- Weight of an invariant, 96, 225;
 of a covariant, 97, 226;
 of a polynomial, 222;
 of a symmetric polynomial, 245, 253.

The first part of the book is devoted to a general history of the world, from the beginning of time to the present day. The author discusses the various civilizations that have flourished on the earth, and the progress of human knowledge and industry. He also touches upon the political and social changes that have shaped the modern world.

The second part of the book is a detailed account of the history of the United States, from its early settlement to the present. The author describes the struggles of the colonists for independence, the growth of the young nation, and the various conflicts that have marked its history. He also discusses the political and social developments that have shaped the United States into the powerful nation it is today.

The third part of the book is a history of the world from the year 1800 to the present. The author discusses the various revolutions and wars that have shaped the modern world, and the progress of human knowledge and industry. He also touches upon the political and social changes that have shaped the modern world.

The fourth part of the book is a history of the world from the year 1800 to the present. The author discusses the various revolutions and wars that have shaped the modern world, and the progress of human knowledge and industry. He also touches upon the political and social changes that have shaped the modern world.

The fifth part of the book is a history of the world from the year 1800 to the present. The author discusses the various revolutions and wars that have shaped the modern world, and the progress of human knowledge and industry. He also touches upon the political and social changes that have shaped the modern world.

The sixth part of the book is a history of the world from the year 1800 to the present. The author discusses the various revolutions and wars that have shaped the modern world, and the progress of human knowledge and industry. He also touches upon the political and social changes that have shaped the modern world.

512
B671i

QA155
B66

1020055220
F.G.

2

AUTOR

BOCHER, Maxime

TITULO

Introduction to higher al-
gebra

121055

