## Contents

72

1. Preliminaries . .

B. The Singular Locus .

C. Comments and References

	A. Notations and Conventions	1
	B. Minors and Determinantal Ideals	3
	C. Determinantal Rings and Varieties	4
	D. Schubert Varieties and Schubert Cycles	6
	E. Comments and References	9
2.	Ideals of Maximal Minors	10
	A. Classical Results on Height and Grade	10
	B. The Perfection of $I_m(X)$ and Some Consequences	13
	C. The Eagon-Northcott Complex	16
	D. The Complex of Gulliksen and Negård	22
	E. Comments and References	25
9	Generically Perfect Ideals	27
U.	<b>Constituting</b> 1 cross constitution	27
		30
	B. The Substitution of Indeterminates by a Regular Sequence	34
	C. The Transfer of Integrity and Related Properties	36
	E. Comments and References	36
		00
4.	Algebras with Straightening Law on Posets of Minors	38
	A. Algebras with Straightening Law	38
	B. $G(X)$ as an ASL	40
	C. The Linear Independence of the Standard Monomials in $G(X)$	43
	D. $B[X]$ as an ASL $\ldots$	45
	E. Comments and References	48
ĸ	The Structure of an ASL	50
u.		50
	A. ASL Structures on Residue Class Rings	53
	B. Syzygies and the Straightening Law	54
	C. Nilpotents, Regular Elements and Dimension	58
	D. Wonderful Posets and the Cohen-Macaulay Property	61
		63
	1. Comments and references	
6.	Integrity and Normality. The Singular Locus	64
	A. Integrity and Normality	64

Contents

73

73

74

76

80

82

84

88

91

93

93

97

100

104

105

105

108

112

117

120

122

122

124

126

133 135

135

137

141

145

149

152 153

153

155

158

160

162

165

171

173

E. The Classical Generic Point for  $G(X; \gamma)$  . . . .

vi

F.  $G(X; \gamma)$  and  $R(X; \delta)$  as Rings of Invariants . . . . . G. The Depth of Modules of Invariants . . . . . . 8. The Divisor Class Group and the Canonical Class . . . . .

A. Ideals and Subalgebras of Maximal Minors . . . . . . . . .

C. Graded Algebras with Respect to Ideals of Maximal Minors

A. Symbolic Powers of Determinantal Ideals . . . . . .

B. The Symbolic Graded Ring . . . . . . . . . . . . . . . . .

C. The Decomposition of K[X] into Irreducible G-Submodules

E. U-Invariants and Algebras Generated by Minors . .

B. The Perfection of a Generic Module . . . . .

C. Homological Properties of Generic Modules . . . .

C. Primary Decomposition of Products of Determinantal Ideals .

A. The Filtration of K[X] by the Intersections of Symbolic Powers B. Bitableaux and the Straightening Law Revisited . . . .

D. The Depth of Powers of Ideals of Maximal Minors . . .

E. Comments and References . . . . . . . . . . . .

B. ASL Structures on Graded Algebras Derived from an Ideal . . .

B. The Canonical Class of  $R_{r+1}(X)$  . . . . . . . .

C. The General Case . . . . . . . . .

9. Powers of Ideals of Maximal Minors

D. Comments and References . . . . . . .

A. A Propedeutic Example. Principal Radical Systems . . . B. A Principal Radical System for the Determinantal Ideals . C. The Perfection of Determinantal Ideals . . . . . D. Comments and References 162 A. The Perfection of the Image of a Generic Map . . .

Contents			

vii

. . . . 232

14.	The Module of Kähler Differentials	•				174
	A. Perfection and Syzygies of Some Determinantal Ideals					
	B. The Lower Bound for the Depth of the Differential Module .					
	C. The Syzygetic Behaviour of the Differential Module					181
	D. Comments and References					183
15.	Derivations and Rigidity					184
	A. The Lower Bound for the Depth of the Module of Derivations					
	B. The Perfection of the Module of Derivations					189
	C. Syzygetic Behaviour and Rigidity					
	D. Comments and References					
16.	Appendix					202
	A. Determinants and Modules. Rank					202
	B. Grade and Acyclicity					
	C. Perfection and the Cohen-Macaulay Property					
	D. Dehomogenization					
	E. How to Compare "Torsionfree"					
	F. The Theorem of Hilbert-Burch					
	G. Comments and References	•	•	•	•	218
Bib	liography					219
Ind	ex of Notations					229

Subject Index . . . . .