## An Analytic Table of Contents in which are listed definitions, rules, lemmas, theorems and important terms

PART ONE: 1	LOGICS ANI	D DIALECTICS
Chapter I.	The philos	ophical situation
I.1.	critical dialo	atic system to a contract about rules for gues. A survey of the forms of logical theory n of the century
	three "lav	ws of thought" of traditional logic 3
	The Theo	retical Cube (Figure I.1.) 4
	(i)	syntactical dimension; logical constants, lexicon
	(ii)	dimension of logical strength; classical logic, constructive (intuitionistic) logic; minimal logic 5-7
	(iii)	dimension of modes of presentation, or "garbs"; axiomatic garb; inferential garb; model-theoretic garb; dialectical garb
		1. The algebraic approach; 2. Axiomatics; 3. Model theory; 4. Natural deduction; 5. Sequent systems; 6. Method of semantic tableaux, counter-example, valuation problem, reduction rules; 7. Method of deductive tableaux, deduction problem; 8. Dialogue games; 9. Method of dialogical tableaux 8-13
1.2.	The unity of	the garbs and methods in modern logic 13

I.3.		On the different uses of "formal" and "deductive" and on the different views about the grounds of validity 14		
	(i)	$form_1, formal_1 \dots 14-15$		
	(ii)	form <sub>2</sub> , formal <sub>2</sub> ; formally, deductively valid, formal consequence; bona consequentia, deduction in "logical space" (formal <sub>1</sub> ), suppositio naturalis (potentialis); formal <sub>2</sub> deduction 15–19		
	(iii)	form <sub>3</sub> , formal <sub>3</sub> , formal <sub>3</sub> procedure 19		
I.4.	Problem-solv philosophy o	ring and social contract: ten theses on the of logic		
	principal	objective of theoretical logic 19 -20		
		s Principle of the Absolute; 'the logic',		
		system or principle ( $\sigma$ ); $\sigma_1$ should be pre- $\sigma_2 \ldots \ldots$		
	quate in r	ellectual language-problem $(\pi)$ ; $\sigma$ is aderespect of $\pi$ ; $\sigma_1$ is objectively better than bjectively valid; problem-solving validity . $20-21$		
	company logically	zzip; logical convention; social contract; ( $\gamma$ ); $\sigma$ is a conventional principle of $\gamma$ ; $\sigma$ is valid; intersubjective/conventional validity; mi-conventional validity		
1.5.	From Cogita	o to Dubito		
1.6.	Remarks on sions	conflicts, agression, and critical discus-		
	(i)	conflicts of opinion		
	(ii)	status quo; flux of opinions; power systems; critical debate 25-26		
1.7.	Glimpses fro	om traditional philosophy 26		
	(i)	debate; topics; probable dialectics; rhetoric		
	(ii)	ars disserendi; Vernunftlehre; Wissenschaft der Logik; dialectica 26–27		
	(iii)	external Secondness; das Du; associative thought		

II.2.	Declarative (descriptive) languages of the form $\mathfrak{J}$ 41
	the language $J_1$ ; elementary/atomic sentence (atom), connective, sentence, grammatical (formation) rules, syntax, construction diagram, principal operator; conditional (sentence), antecedent, consequent, purely implicational languages/languages of the form $J$ ; mode of construction, application of a ——; (proper) subsentence, — formula; dummy sentence, the language $J_0$ ; the arrow; generating specifications (inductive clauses), generating/inductive/recursive definitions, generated/inductive class
	•
II.3.	Declarative (descriptive) languages of the forms $\mathfrak{F}$ and $\mathfrak{F}^{\wedge}$
	languages of the form $\mathcal{T}$ ; negations, conjunctions, veljunctions; the language $\mathcal{T}_0$ , the ampersand, the vee, the tilde; languages of the form $\mathcal{T}^{\Lambda}$ , $\Lambda$ (absurd/decidedly false sentence or veljunction of sentences)
11.4.	Dialectical languages and language forms 50
	non-descriptive/non-declarative/dialectical sentence forms, challenging/hypothetical, interrogative, exclamatory
	dialectically augmented language forms $\mathfrak{I}_{\mathbf{D}},  \mathfrak{T}_{\mathbf{D}},  \mathfrak{T}_{\mathbf{D}}$
	dialectical language/D-language $\mathfrak{L}_{\mathrm{D}},\mathfrak{L}_{\mathrm{D}}^{\Lambda}$ 51
	declarative sentence assertive —, hypothetical –, question, exclamation; statement, assertive —, hypothetical —
11.5.	Speech acts
	list of schools and theories, with most prominent speech acts; theory of argumentation, verbal dialectics, verbalized "double focus", interaction of
	speech acts
	Exercises 52

Chapter III		opinion and methods for their	54
		valid; dialectica, Obligation Game, efinit; language-invariant rules 54-	-55
Ш.1.	Conflicts of avo	owed opinions	56
	Def. 1	conflict of avowed opinions, thesis, concessions, pure/simple conflict, mixed —	56
		f avowed opinion, opposition of opinion	-57
III.2.	Deciding to dis	cuss. Dialogue attitudes	57
	Def. 2	resolved	57
		al attitudes, statemental dialogue atti-	-58
	Def. 3	pro-position	58
	Def. 4	contra-position	58
	Def. 5	neutral position	58
III.3.	Proponent and	Opponent	58
	dialectical re	oles	- 59
	Def. 6	Proponent	58
	Def. 7	Opponent	58
Ш.4.	Speech acts .		59
	Speaker, Cri	tical Listener (Critic), aU	59
	Def. 8	counter-attack/counter-criticism	59
	defense, $pU$ tion of Diale	ve/indirect defense, ca; protective/ direct; The Principle of (verbal) Externaliza- ectics, ExtDial; aiU, pijU, ca; to critick, to challenge 60-	-62
111.5.	The elementary formal dialectic	rules of some plausible systems of	62
	FD E1	P and O	62
	FD E2	general attitudes of P and O	62
	FD E3	defense act: protective or counter-	62

	FD E4	= <i>ExtDial</i>	62
	FD E5	non-permitted moves	63
	FD E5 super	non-permitted moves	63
III.6.	Systematic diale	ectics	63
	FD S1	(fundamental norm) defense by making another statement	63
	Def. 9	stage	63
	Def. 10	(appropriate) chain of arguments	63
	Def. 11	(appropriate) discussion	64
	Def. 12	intermediary thesis; local thesis	64
	Def. 13	local concessions	64
	Def. 14	local conflict	65
	Def. 15	local discussion	65
	Def. 16	pertains to	65
	FD S2	conditional defense by means of a new local thesis	65
	Exercise .		67
Ш.7.	Realistic dialected defense	tics: The possibility of unconditional	68
	FD R1	(fundamental norm) sometimes an attempt by P shall be successful	68
	Def. 17	appropriate Ipse dixisti!-remark	68
	FD R2	unconditional defense by Ipse dixisti! .	69
	FD R3	loss of rights	70
	Exercise .		70
III.8.	Winning and lo	sing: Definitions and immediate effects.	71
	FD W1	winning a chain of arguments by rational means	71
	FD W2	losing a chain of arguments by rational means	71
	FD W3	"irrational"	71
	Def. 18	completed chain of arguments	72

Analytic Table of C	Contents	X	VII
	FD W4	a. successful defense; b. successful refutation	72
	FD W5	expression, by N, of $\overline{N}$ having won	72
	FD W6	expression, by N, of $\overline{N}$ having lost	72
	FD W7	reopening of discussions	72
	Exercise		72
III.9.		between expression of statemental dialogue loss of rights	73
	Def. 19	contrary dialogue attitudes	73
	Exercise .		74
III.10.	Rights and o	obligations	74
	[ca; p <sub>il</sub> U,	$\ldots, p_{ij}U, \ldots, p_{ik}U$ ] $\ldots$	74
III.11.	Mixed conflic	cts	74
	simple/pu	mixed conflicts, interference among re conflicts; fundamental asymmetry in afficts	-75
Ш.12.	"Natural" ru	les; "Consequences"	75
	(i)	The "naturalness" of the rules suggested here	75
		logic, theory of argumentation, higher-order rules 75-	-76
	(ii)	A note on the meaning of "consequence" in this book	76
III.13.	Thoroughgoi	ng dialectics	76
	FD T1	(fundamental norm) opportunity to attempt attacks/defenses in all possible manners	76
	line of atta	ack/defense	76
	FD T2	retracing one's steps	76
	FD T3	losing a chain of arguments on account of retracing one's steps	76
	Exercise .		77

III.14.	Orderly dialectic	es	77
	FD 01	(fundamental norm) rights and duties determinate	77
	FD O2	a. loss of contra-position; b. loss of right to defend	77
	FD O3	retention of dialogue attitudes and obligations	78
	FD O4	isolation of local discussion	78
	FD O5	a. assuming neutral position; b. cancelling of obligations	78
	Exercises		79
III.15.	Dynamic dialec	tics	79
	FD D1	(fundamental norm) flux of opinions	79
	FD D2	unavoidable decisions to be reached as soon as possible	79
	FD D3	limiting branching off	80
	FD D4	dynamic chain of arguments	80
	FD D5	one utterance at each stage 80-	-81
	FD D6	limitation of counter-attacks	81
	FD D7	O must attack at once or not at all	82
	Def. 20	a. dialogue situation; b. dialectically equal	83
	Def. 21	winning strategy	83
	FD D8	no useless repetition of local thesis	85
	Exercises .		86
III.16.	Dynamic dialec	tics (II)	86
	FD D9	clearly defined structural operators	86
	FD D10	decomposition	86
	F <sub>2</sub> D 1	strip rules ("Lorenzen strips"): Rule, Rule, Rule, Rule, 87-	-88
	Exercise	•	80

analytic T	able of Co	ontents	,	XIX
Chapter IV.		Variants of fo	rmal <sub>3</sub> dialectics	90
		completion of (non-generate	of systems of formal <sub>3</sub> dialectics; fallacy ed move)	90
	IV.1.	Constructive dia	alectic systems	90
	IV.1.1.	A dialectic syste	em with constructive implication	90
		FD R2≡	(fundamental closure rule) if and only if <i>Ipse dixisti</i> !	90
		Def. 1	CID (constructive-IF dialectics)	90
	IV.1.2.		em with constructive implication, con- ction and negation	91
		Def. 2	CND (constructive-NOT dialectics)	91
	IV.1.3.	A dialectic syste	em with constructive $\Lambda$	93
		Def. 3	appropriate Absurdum dixisti!-remark .	94
		FD R2≡v	if and only if <i>Ipse dixisti!</i> or <i>Ab-surdum dixisti!</i>	94
		Def. 4	CAD (constructive-A dialectics)	94
		of arguments	orthand notation for —; discussion, chain s for a sequent	-96 96
	IV.2.	Minimal dialecti	ic systems	96
	IV.2.1.		em with minimal implication	96
	1712121	Def. 5	MID (= CID)	96
	IV.2.2.	A dialectic syste	em with minimal $\Lambda$ : A stricture on the s	97
		Def. 6	MΛD (minimal-Λ dialectics)	97
	IV.2.3.	A dialectic systetion, veljunction	em with minimal implication, conjunc- n and negation	97
		FD M-NOT	a restriction on the permitted counterattacks	97
		Def. 7	MND (minimal-NOT dialectics)	98
		Exercises		98
	IV.3.	Classical dialect	ic systems	98
		FD K	P retains its unused defense rights	98

IV.3.1.	A dialectic syste	m with classical implication	100
	Def. 8	KID (classical-IF dialectics)	100
IV.3.2.	A dialectic syste	m with classical Λ	100
	Def. 9	KAD (classical-A dialectics)	100
IV.3.3.		em with classical implication, conjunc- n and negation	101
	Def. 10	KND (classical-NOT dialectics)	101
	$F_2DK$	protective defense by double negation .	102
	Exercises		102
IV.4.	Summary		102
	schematic su	rvey (Figure IV.6)	103
	Theorem 1	P has a winning strategy in minimal (constructive) system ⇒ P has a winning strategy in constructive (classical) system	103
IV.5.	Formal <sub>3</sub> materi	al dialectic systems	104
	experimenta material trut to accept or	ves, formal <sub>2</sub> moves; ostensive means, tion, consultation, computation; h procedure, material falsity procedure, reject implicitly/explicitly; the classes	-105
IV.5.1.		Material procedures subjoined to our	105
	Def. 11	appropriate Verum dixi!-remark	105
	Def. 12	appropriate Falsum dixisti!-remark	105
	FD R2M	if and only if Ipse dixisti!, or Absurdum dixisti!, or Verum dixi!, or Falsum dixisti!	105
	FD DM1	P may demand application of the material truth procedure to atomic local thesis	106
	FD DM2	P may demand application of the material falsity procedure to atomic concession	

Analytic Table of Co	ntents	XXI
IV.5.2.		s under complete opposition: A formal <sub>3</sub> ctic system
	Def. 13	mixed conflict under complete opposition
	Def. 14	White, Black (roles) 109
	Def. 15	revision of Def. 11, Def. 12 109
	FD M1	revision of FD DM1 110
	FD M2	revision of FD DM2 110
	FD M3	revision of FD R2M 110
	Def. 16	MatDial (material dialectics for the resolution of mixed conflicts under complete opposition)
	Exercises .	
		AND DERIVATIONS
Chapter V.		itegies and dialogical strategy
		reconstruction of the notion of 'logical 
V.1.	Dialogue sequ	ents 117
	Def. 1	dialogue sequent
	official syst	tem, P-liberalized system 119
	Lemma 1	equivalence of official systems and P-liberalized systems
		notation for dialogue sequents; a <sub>i</sub> Z,
	types of sec	quents: P, OI, OII, OIII
	Lemma 2	circulation of types 122

material dialogue sequent . . . . . . . . . 123

Def. 2

V.2.	Strategy diagran	ns 124
V.2.1.	Tree diagrams	
	Def. 3	tree; root; predecessor
		infinite tree, successor, final node, to
	dominate, pa	th, branch
	Def. 4	tree diagram
	Def. 5	N-strategy diagram 126–127
	Def. 6	N-winning strategy diagram 127
V.2.2.	Rules for constr	ructing P-winning strategy diagrams 128
	OI→, etc., O	rules, choice rules, closure rules; rules II, OIII \rightarrow, etc., Pd, P \rightarrow, etc., Pid,
V.2.3.	König's Lemma	on trees
	Def. 7	finitely branching
	Lemma 3	König's Lemma
	Exercises .	
V.3.	Dialogical strate	egy tableaux
		bleaux, tree form notation, subtableaux, tableau
	Caveats 1-6	
	schematic re	epresentation of rules 137–139
	Exercises .	
V.4.	Some simple pr	roperties of dialectic systems 139
	Lemma 4	local discussions are finite 139
	measure of t	the complexity of dialogue situations 139
	Lemma 5	a chain of arguments in MatDial is finite
	Lemma 6	subformula property 141
	Lemma 7	each chain has finitely many local discussions
	Def. 8	locally finite
	Theorem 2	the official dialectic systems and MatDial are locally finite 141

Rule of Conditional Proof . . . . . . . . . 157

Trivial Deduction Rule, iteration rule . 157

scope, scope indicator, subordinate deduction . . . . . 157

CP

TRIV

	Def. 1	MInd/Clnd (minimal/constructive-IF natural deduction)	7
	Def. 2	deduction for a sequent according to a linear system of natural deduction 15	8
VI.1.2.	Minimal deduct negation and $\Lambda$	ion rules for conjunction, veljunction,	1
	$SEP_1$ , $SEP_2$	Separation Rules 16	1
	CONJ	Conjunction Rule	1
	CD	Rule of Case Distinction, Constructive Dilemma	1
	$AD_1, AD_2$	Addition Rules, adjunction rules, veljunction rules	1
	ECΛ	Ex Contradictione Sequitur $\Lambda$ 16	2
	RΛ	Reductio ad A Rule 16	2
	Def. 3	M $\Lambda$ nd (minimal- $\Lambda$ natural deduction) . 16	3
	$\Lambda_1, \Lambda_2$		3
	Theorem 5	variants of MAnd, etc 16	3
VI.1.3.	Minimal deduct volve $\Lambda$	tion rules for negation that do not in	5
	ECQN	Ex Contradictione Sequitur Quaelibet Negatio	5
	MR	Minimal Reduction Rule 16	5
	Def. 4	MNnd (minimal-NOT natural deduction)	6
	Exercises .		6
VI.2.	Constructive na	itural deduction rules 16	6
VI.2.1.	An additional o	constructive deduction rule for $\Lambda$ 16	6
	ΕΛQ	Ex Λ Sequitur Quodlibet 166 - 16	57
	Def. 5	CAnd (constructive-A natural deduction)	57
VI.2.2.		constructive rule for negation that does	57
	ECQ	Ex Contradictione Sequitur Quodlibet	<b>5</b> 8

Analytic Table of C	Contents	XXV
	Def. 6	CNnd (constructive-NOT natural deduction)
	Exercises .	168
VI.3.	Classical natura	ıl deduction rules
VI.3.1.		classical deduction rule that involves y
	P	Peirce's Rule 169
	Def. 7	KInd (classical-IF natural deduction) 169
VI.3.2.	An additional of	classical deduction rule that involves $\Lambda$ 170
	ΡΛ	<i>Peirce-</i> Λ <i>-Rule</i> 170
	Def. 8	KAnd (classical-A natural deduction) . 170
VI.3.3.	Additional clas	sical rules that do not involve $\Lambda \ldots 170$
	KR	Classical Reduction Rule 170-171
	Def. 9	KNnd (classical-NOT natural deduction) 171
	EM	Rule of Excluded Middle 171–172
	DN	Double Negation Elimination Rule 171–172
	Theorem 6	variants of KNnd 172
	Exercises .	
VI.4.	Purely hypothe	etical variants
VI.5.	Replacement o	f equivalents
	REP	Replacement of Equivalents 176
	Def. 10	a. equivalent to under (premises); b. interdeducible with 177
	Lemma 1	lemmas for replacement 177
	Theorem 7	admissibility of REP 177 - 178
	Exercises .	179
Chapter VII.	Deductive ta	bleaux 180
		sired goal firmly in mind; reduce problem roblems

VII.1.	Deductive tablea constant	iux with implication as the only logical
VII.1.1.		ux with minimal (and constructive)
	premises (ÎI); problem, left	oblem $(\Pi/Z)$ , concludendum $(Z)$ , reduction rule, trivial deduction rule, right rule; $\rightarrow 1$ , $\rightarrow r$ (rules for the closed problem, c ( <i>Closure Rule</i> ) 180 - 182
	Def. 1	<ul><li>a. deductive tableau for a sequent,</li><li>based on a system of reduction rules;</li><li>b. closed deductive tableau 182</li></ul>
	Lemma 1	a closed deductive tableau is finite $\dots$ 182
	Def. 2	MIdt or Cldt (a system of rules for constructing deductive tableaux) 184
	Lemma 2	"tape theorem" for MIdt $\dots 185$
VII.1.2.	Deductive tal	bleaux with classical implication 189
	Lemma 3	no closed tableau for some "classically valid" sequents
	Def. 3	KIdt 191
	Lemma 4	"tape theorem" for KIdt 192
	Exercises	
VII.2.	Transformation tableaux	of dialogical tableaux into deductive
	unit, half a u	nit
	Lemma 5	P-winning strategy (MID, KID) ⇒ closed deductive tableau (MIdt, KIdt) . 196
	Exercises	
VII.3.	The theory of d forms $\mathfrak{T}$ and $\mathfrak{T}'$	eductive tableaux, for languages of the
	(rules for vel	r (rules for conjunction), $vl$ , $vr_1$ , $vr_2$ (junction), $\sim l_{\Lambda}$ , $\sim r_{\Lambda}$ , $\sim l_{min}$ , $\sim l$ , $\sim r$ gation); other rules: $\Lambda c$ , $\rightarrow \Lambda K$ , $\sim K$ 198 – 202
	Def. 4	MΛdt, MNdt, CΛdt, CNdt, KΛdt, KNdt
	Theorem 8	(the full "tape theorem") closed deductive tableaux ⇒ natural deduction
		don 203

IX.3

	agreement, P Agreement, ( (Agreement) agreed, dialed	mantics, dialectical subject, positive rinciple of Cumulation/Preservation of possible) dialectical situation (d), A, N (Non-agreement), Agreed, Notcical development relation (R), cumulation-) trivial cumulative develop-	-245
	Def. 5	normal dialectical structure	245
	Positively-Ag	reed-in-d, Not-Agreed-in-d	
	Def. 6	•	
	Def. 7	constructive dialectical model	246
	labeled graph	ıs	247
	Def. 8	constructive valuation ( $Sem_{At}^c$ , $Sem^c$ &, $Sem^c$ v, $Sem^c$ $\rightarrow$ , $Sem^c$ $\sim$ , $Sem^c$ $\wedge$ )	248
	Lemma 3	"rules for <b>N</b> "	248
	Lemma 4	cumulation of agreement	249
	Def. 9	a. constructive model for $\Pi/\Gamma;$ b. constructive counter-example to $\Pi/Z;$ c. constructively valid (sequent) . 249–	-250
	Lemma 5	constructive validity of the rule $MP$	250
	Theorem 13	(second soundness theorem) the constructive axiomatic method is dialectically sound	250
	Exercises		252
IX.4. At	osurdity and n	ninimal dialectical models	252
	absurd dialectical situation, normal 25		
	Def. 10	minimal dialectical structure	253
	Def. 11	cumulative interpretation (on a minimal dialectical structure)	253
	Def. 12	minimal dialectical model	253
	Def. 13	minimal valuation ( $Sem_{At}^{m}$ , $Sem^{m} \rightarrow$ , $Sem^{m} &$ , $Sem^{m} \vee$ , $Sem^{m} \sim$ , $Sem^{m} \wedge$ )	-254
	Lemma 6	"rules for <b>N</b> "	
	Lemma 7	cumulation of agreement	254

		Def. 14	a. minimal model for $\Pi/\Gamma$ ; b. minimal counter-example to $\Pi/Z$ ; c. minimally valid (sequent)	255
		Theorem 14	(third soundness theorem) the minimal axiomatic method is dialectically sound even when absurd situations are admitted	255
		Theorem 15	classical (constructive) logic is stronger than constructive (minimal) logic	256
		Exercises		256
	IX.5.	Non-cumulative	dialectical models	257
			ans, companies of —; kinds of non- ogic; rationality	257
Chapter	X	Semantic tabl	eaux	258
			inding out whether a sequent is modelvalid	258
X.1.	X.1.	Semantic tablea	ux for classical implication	259
		tion rule, triv	roblem, validity problem ( $\Pi/\Gamma$ ); reductial evaluation problem, trivially valid; les for the conditional) 259-	-260
		Lemma 1	M is a model for the sequent on the left   M is a model for at least one sequent on the right	260
		C (Closure R	ule)	260
		Def. 1	a. classical semantic tableau for a sequent, based on a system of reduction rules; b. closed classical semantic tableau	261
		Def. 2	KIst	261
		Lemma 2	a closed semantic tableau (KIst) is finite	261
		Theorem 16	closed classical semantic tableau (KIst) ⇒ sequent is classically valid	261
		Def. 3	U has had sufficient attention by the (left/right) rules, concerning $\Pi/\Gamma$	263
		Def. 4	onen seguent	264

	Def. 5	Hintikka sequent	264
	Lemma 3	Hintikka sequents are classically invalid	265
	Lemma 4	tableau for $\Pi/\Gamma$ containing Hintikka sequent shows classical invalidity of $\Pi/\Gamma$	265
		(B), $(C)$ for constructing semantic st)	266
	Lemma 5	tableau constructed in accordance with (C) will close or yield Hintikka sequent	266
	Theorem 17	(first completeness theorem) sequent is classically valid $\Rightarrow$ a closed semantic tableau can be constructed	267
	Def. 6	a. decision procedure; b. decidable concept	267
	Theorem 18	(first decidability theorem) a. 'classical validity' is a decidable concept; b. to construct a semantic tableau in accordance with our directives is to apply a decision procedure	267
	Exercises		268
X.2.	The theory of c of the forms $\mathcal{F}$	lassical semantic tableaux, for languages and $\mathfrak{F}^{\Lambda}$	269
		les for conjunction), v L, v R (rules for $\sim L$ , $\sim R$ (rules for negation)	269
	Lemma 6	[≈ Lemma 1]	269
	CΛ (a new cl	losure rule)	269
	Def. 7	a. KNst; b. KAst	270
	Lemma 7	[≈ Lemma 2]	270
	Theorem 19	[≈ Theorem 16]	270
	Def. 8	sufficient attention	271
	Lemma 8	[≈ Lemma 3 and Lemma 4]	271
	directive ( $C'$	)	273
	Lemma 9	[≈ Lemma 5]	273
	Theorem 20	(second completeness theorem) [≈ Theorem 17]	273

	Theorem 21	(second decidability theorem) [≈ Theorem 18] 27.	3
	Exercises	27	3
X.3.	The theory of co	onstructive semantic tableaux 274	4
	Def. 9	a. model for a set of sequents; b. con- structively (minimally) valid set of sequents	4
		$(=C^m)$ , $\rightarrow L^c$ (= $\rightarrow L^m$ ) (rules for the con- (= $C^m$ ) (a closure rule) 275–27	6
	Def. 10	CIst, MIst 27	6
	Def. 11	a. constructive (minimal) semantic tableau for a set of sequents, based on a system of reduction rules; b. constructive (minimal) semantic tableau for a sequent; c. closed constructive (minimal) semantic tableau	'6
	vention 2: or $(=\& L^m)$ , & $\lor L^c (=\lor L^m)$ $\sim L^c$ , $\sim R^c$	t; Convention 1: dashes and dots; Conrder of rule applications; & L <sup>c</sup> R <sup>c</sup> (=& R <sup>m</sup> ) (rules for conjunction); y, v R <sup>c</sup> (=v R <sup>m</sup> ) (rules for veljunction); rules for negation); CΛ <sup>c</sup> (a closure	79
	Lemma 10	M is a model for the set of sequents on the left   M is a model for at least one of the sets of sequents on the right 27	19
	Def. 12	a. CNst; b. CAst	0
	Lemma 11	a closed semantic tableau (CIst, CNst, CAst) is finite	80
	Theorem 22	closed constructive semantic tableau ⇒ (set of) sequent(s) is constructively valid	80
	Def. 13	in the set $\Sigma$ , the sentence U has had sufficient attention by the (left/right) rules concerning the sequent $\Pi/\Gamma$ 28	81
	Def. 14	open set of sequents	81
	Def. 15	Hintikka set (of sequents) 28	82
	Lemma 12	Hintikka sets are constructively invalid. 28	82

	Lemma 13	tableau for $\Sigma$ containing Hintikka set shows that $\Sigma$ is constructively invalid .	283
	Def. 16	a. creative rules, normal rules; b. internally complete (sequent)	285
	directives (A	(A, B), $(B)$ , $(C)$	286
	Lemma 14	tableau constructed in accordance with (C) will close or yield Hintikka set	286
	Theorem 23	(third completeness theorem) (set of) sequent(s) is constructively valid ⇒ a closed constructive semantic tableau can be constructed	288
	Theorem 24	(third decidability theorem) a. 'constructive validity' is a decidable concept; b. to construct a constructive semantic tableau in accordance with our directives is to apply a decision procedure	288
	Exercises		288
X.4. Th	ne theory of m	ninimal semantic tableaux	289
21. 1.	•	(rules for negation)	290
	Def. 17	MΛst, MNst	290
	Lemma 15	•	-/-
	Lemma 15 Lemma 16	[≈ Lemma 10]	290 291
	Lemma 16	•	290
	Lemma 16	[≈ Lemma 10]	290 291 291
	Lemma 16 Theorem 25	[≈ Lemma 10]	290 291 291
	Lemma 16 Theorem 25 Def. 18	[≈ Lemma 10]	290 291 291 293
	Lemma 16 Theorem 25 Def. 18 Lemma 17	[≈ Lemma 10]	290 291 291 293 293
	Lemma 16 Theorem 25 Def. 18 Lemma 17 Lemma 18 Lemma 19	[≈ Lemma 10]	290 291 291 293 293 293
	Lemma 16 Theorem 25 Def. 18 Lemma 17 Lemma 18 Lemma 19 Theorem 26	[≈ Lemma 10]	290 291 291 293 293 293 294
	Lemma 16 Theorem 25 Def. 18 Lemma 17 Lemma 18 Lemma 19 Theorem 26 Theorem 27	[≈ Lemma 10]	290 291 291 293 293 293 293 294 295

Chapter XI.	The unity of the garbs $-$ and what next $\dots$ .	297
	the unity of the garbs and of the methods in (elementary) modern logic	297
<b>XI</b> .1.	How to prove the missing link	297
	Theorem 28 (stated) a semantic tableau for $\Pi/Z$ is closed $\Rightarrow$ there is a P-winning strategy for $\Pi/_{O}Z$	297
XI.2.	Constructive and minimal systems. Equivalences concerning the existence of winning strategies	298
	Lemma 1	299
XI.3.	Classical systems. Equivalences concerning the existence of winning strategies	300
	Lemma 2	300
XI.4.	Classical systems. From closed semantic tableau to winning strategy for the Proponent	300
	Lemma 3 closed semantic tableau for $\Pi/\Gamma \Rightarrow$ P-winning strategy for $\Pi/P \Gamma$ (classical systems)	301
	Exercise	
XI.5.	Constructive and minimal systems. From closed semantic tableau to winning strategy for the Proponent	302
	Lemma 4 closed semantic tableau for $\Sigma \Rightarrow$ for at least one $\Pi/\Gamma \in \Sigma$ , there is a P-winning strategy for $\Pi/P$ (constructive and	202
	minimal systems)	
VI.	F. 9 1	205
XI.6.	Full circle	
	Theorem 28 (proved)	
	schematic survey (Figure XI.1)	
	consequence: Gentzen's Hauptsatz	
XI.7.	What next in the Theory of Argumentation?	