

Cambridge University Press & Assessment 978-1-107-11346-6 — Proofs and Refutations Imre Lakatos , Edited by John Worrall , Elie Zahar Index

More Information

Index of names



Important entries have italicised numerals

Abel, N. H., 30, 30, 59, 139, 141–4, 146 Aetius, 34 Agassi, J., xii Aleksandrov, A. D., 58 Ambrose, A., 44 Arber, A., 10 Aristotle, 58, 87, 110, 129, 131 Arnauld, A., 108

Bacon, F., 115
Baltzer, R., 17, 49, 93
Bartley, W. W., 110
Becker, J. C., 34, 49, 93, 103
Bell, E. T., 93, 149, 160
Bell, J. L., xii
Bérard, J. B., 26
Berkeley, G., 119
Bernays, P., 3
Bolyai, J., 147
Bolzano, B., 109
Boole, G., 2
Bourbaki, N., 143, 160
Bover, C., 136

Boyer, C., 136 Braithwaite, R. B., xii, 149, 152 Brouwer, L. E. J., 55

Cantor, G., 59
Carathéodory, C., 162
Careil, F. de, 6
Carnap, R., 1, 97, 99
Carslaw, H. S., 157
Catalan, E. C., 146
Cauchy, A. L., ix–x, 8, 13, 14, 28, 42, 48, 49, 59, 63, 69, 90, 92, 96, 103, 128, 129, 131, 133, 136–47, 149, 156–8, 160–2

Cayley, A., 18, 95 Chrysippus, 10, 34 Church, A., 1 Clairaut, A. C., 52 Cleanthes, 10 Cohn-Vossen, S., 17, 43, 118 Columbus, C., 15 Copi, I. M., 2 Crelle, A. L., 9, 27, 69, 95 Currie, G., xii Curry, H. B., 2

Darboux, G., 53, 94, 149
Denjoy, A., 25
Descartes, R., 6, 87, 88, 103, 113, 132
Dieudonné, J., 2
Diogenes Laertius, 10
Dirac, P., 2, 119
Dirichlet, P. L., 138–9, 149, 156–62
du Bois-Reymond, P. D. G., 143, 150, 157, 159
Dyck, W., 118

Einstein, A., 99 Eschweiler, T. J., 27 Euclid, 15, 48, 52, 90, 149 Euler, L., 6–7, 9, 10, 12, 15, 41, 49, 58, 69, 90, 92, 97, 103 Eves, H., 48

Félix, L., 99, 108 Forder, H. G., 51 Fourier, J., 136–9, 141, 157, 160 Fréchet, M., 78 Frege, G., 55, 60 Fresnel, A., 147

Galileo, 66
Gamow, G., 48
Gauss, C. F., 10, 149, 159
Gentzen, G., 55
Gergonne, J. D., 14, 21, 29, 39, 63, 69, 103, 115
Gödel, K., 2
Goldschmidt, R., 24
Grattan-Guinness, 137
Grunert, J. A., 21, 27, 93, 103



Cambridge University Press & Assessment 978-1-107-11346-6 — Proofs and Refutations Imre Lakatos , Edited by John Worrall , Elie Zahar Index

More Information

176

INDEX OF NAMES

Hacking, I., xii Haeckel, E., 4 Hallett, M., xii Halmos, P., 163 Hankel, H., 20, 162 Hansteen, C., 142 Hardy, G. H., 31, 39, 48, 143 Haussner, R., 20 Heath, T. L., 10, 83 Hegel, G. W. F., 133, 147 Heis, E., 27 Hermite, C., 21 Hessel, F. C., 14, 17, 17, 27, 29, 39, 41, 63, 71, 78 Heyting, A., 55-6 Hilbert, D., 1, 17, 43, 59, 118 Hobbes, T., 5, 96 Hölder, O., 10 Holmboë, B. M., 146 Hoppe, R., 83, 85

Jonquières, E. de, 9, 16, 23, 33, 37, 41, 64 Jordan, C., 69, 93, 103, 143, 157

Jourdain, P. E. B., 160

Husserl, E., 55

Kant, I., 2, 52, 55, 58, 87 Kepler, J., 18, 35, 90 Kneale, W. C., xii Knopp, K., 149

Lagrange, J. L., 136 Lakatos, I., ix–xi, 1, 5, 59, 111, 154, 155 Landau, E., 48 Laplace, P. S., 136 Lebesgue, H., 57, 93 Legendre, A. M., 15, 30, 64, 69, 103, 136 Leibniz, G. W. F., 6, 52, 136, 137 Lhuilier, S. A. J., 12, 14, 21, 27, 29, 37, 39, 63, 69, 71, 78, 97, 103 Listing, J. B., 97, 102–3, 103, 115 Littlewood, J. E., 31, 39

Machover, M., xii MacLennan, B., xii Marx, K., 155 Mathiessen, L., 9, 27, 33, 37, 41 Meister, A. L. F., 20 Menger, K., 162

Lobatschewsky, P. I., 147

Loève, M., 163

Mitchell, S. D., xii Möbius, A. F., 17, 85, 103 Moigno, F. N. M., 139, 149 Montague, R., xii Moore, E. H., 57 Morgan, A. de, 147 Munroe, M. E., 22 Musgrave, A., xii

Neumann, J. von, 104 Newsom, C. V., 48 Newton, I., 2, 30, 52 Nicole, P., 108

Olivier, L., 93

Pappus, 10, 68, 83 Paracelsus, 35 Parmenides, 52 Pascal, B., 58, 113, 130, 131, 145 Peano, G., 1–2

Pictet, J., 14 Pierpont, J., 160 Plato, 86

Poincaré, H., ix, 4, 25, 49, 52, 55, 69, 78, 86, 93

Poinsot, L., 9, 18, 19, 21, 30, 34, 37, 39, 64–5, 69, 90, 91

Poisson, S.-D., 137 Polanyi, M., xii Pólya, G., xii, 3–4, 7, 10, 31, 39, 40, 43, 45, 72–3, 74, 78, 95, 101, 104, 114, 122, 124

72–3, 74, 78, 95, 101, 104, 114, 122, 124 Popper, K. R., xii, 3, 24, 33, 42, 52, 99, 105, 110, 111, 130, 131, 147, 155, 162

Pringsheim, A., 143 Proclus, 10 Pythagoras, 55

Quine, W. V. O., 2, 4

Ramsey, F. P., 128
Raschig, L., 82
Ravetz, J., xii, 137
Reichardt, H., 43
Reichenbach, H., 152
Reiff, R., 143
Reinhardt, C., 118
Riemann, B., 10, 139, 156
Robinson, R., 10, 80, 86
Rudin, W., 48, 154, 156
Russell, B., 1–2, 48, 51, 60, 128, 133



Cambridge University Press & Assessment 978-1-107-11346-6 — Proofs and Refutations Imre Lakatos , Edited by John Worrall , Elie Zahar Index More Information

INDEX OF NAMES

177

Saks, S., 21 Schläfli, L., 18, 103, 115 Schröder, E., 20 Schwartz, H. A., 129 Schwartz, L., 2 Seidel, P. L., 53, 145, 149 Sextus Empiricus, 34, 55 Smiley, T. I., xii Sommerville, D. M. Y., 65 Staudt, K. G. C. von, 103 Steiner, J., 63, 69 Steinhaus, H., 37 Steinitz, E., 49, 92, 97 Stieltjes, T. J., 21 Stokes, G., 149 Sylow, L., 143 Szabó, Á., 10, 52 Szegö, G., 40 Szökefalvi-Nagy, B., 157

Tarski, A., 3, 48, 110, 131 Turquette, A., 2

Vesalius, 3

Waerden, D. L. van der, xii, 43 Watkins, J. W. N., xii Weierstrass, K., 48, 59, 128, 133, 159 Whewell, W., 136 Whitehead, A. N., 1 Wilder, R. L., 31, 39

Young, W. H., 150

Zacharias, M., 39 Zeno, 52 Zermelo, E., 55 Zygmund, A., 157



analysis, 10

Cambridge University Press & Assessment 978-1-107-11346-6 — Proofs and Refutations Imre Lakatos , Edited by John Worrall , Elie Zahar Index More Information

Index of subjects



Platonic, as, 10, 112 test thought-experiments, 79 can turn tests into proofs, 100 see also synthesis a priori synthetic judgments, 115 authoritarianism, 151, 155, 163 axioms absolute truth of, 115 complicated and artificial, 151 fallibility of, 60 background knowledge, 60, 74 bounded variation: origin and discovery of, 155-62 capital, Marx's theory of, 155 Cauchy's theorem on continuity, ix, 136-50, 154 on integrals, 149 cavities, 97 certainty, 92, 108, 131 and finality, 67, 128 chains, k-, 119-25 properties of, 120 form a vector space, 123 circuit, k-, 120 form a subset of the chain space, 123 classification naive versus theoretical, 97 nominal versus real, 97 clear and distinct ideas, 34 concept-formation, 70, 89-104 see also concepts, concept-stretching concepts naive, 95 naive and theoretical, 99-100 precise versus vague, 106, 129 proof-generated, 95-6, 136, 139, 153-63 refutation-generated, 91

concept-stretching, 22-4, 89-92, 99-101, 106-8 and lemma-incorporation, 94 limits to, 101, 105-11 may refute a theorem, 104-5 surreptitious versus open, 109 theoretical versus naive, 99-100 see also concept formation, concepts conceptual instrumentalism, 161 conditions difficult to achieve for Descartes-Euler conjecture, 127 sufficient and necessary, 67-9 see aslo theorem conjectures, 80 ad hoc, 53 improving, 28-9, 35-45 inductive, 77 naive (primitive), 44, 78, 96, 135 plausible and implausible, 13 proving false, 14-15, 39, 80 rejection of, 13 subconjectures, 10-15 conjectures and refutations, method of, 78, 158 content, 60-89 and depth, 103 and finality-certainty conditions, 67 increasing, 60-7, 85, 101-5 comparison of proofs for, 69 context of discovery and context of justification, 152 continuity Abel's theorem on, 142 Cauchy's characterisation of, 154, 156 Fourier's conception of, 137 piecewise, 161 of principle, 135, 153 conventionalist strategem, 105 conventions, 121, 126 convergence, 135-44, 149 infinitely slow, 138 uniform, see uniform convergence corroborations, 7

see also concept-formation, concept-stretching



Cambridge University Press & Assessment 978-1-107-11346-6 — Proofs and Refutations Imre Lakatos , Edited by John Worrall , Elie Zahar Index More Information

INDEX OF SUBJECTS

179

and counterexamples, 92 Cauchy's proof of, 7-8, 63, 69, 94, 96, 146 counterexamples to, (cylinder) 50, (crested logical and heuristic, 87 cube) 74, (nested cube) 36, (picture frame) counterexamples, 11, 87-9 as a reflection on the mathematician, 147 46, (twintetrahedron) 40, (urchin), 18-19 eccentric, 56 decomposed into two parts, 123 global, 11, 15, 35, 46, 143, 153 different versions are the result of different global and local, 32, 50, 67, 88, 135, 140, 154 proofs, 69-70 global but not local, 45-60, 67, 88 formulated in vector-algebraic terms, 121-3 local, 11, 14-15, 46 further generalised to include ringshaped local but not global, 10-12, 60-70, 88 logical and heuristic, 87-9, 92, 98-9 generalised to n-spheroid polyhedra, 83 mock, 154 Gergonne's proof of, 63, 69, 96 not necessary for proof-analysis, 51 irrefutable master-theorem, 54, 67 petty, 55 Jordan's version of, 103 rejection of, 15-26 Legendre's proof, 64, 69 theoretical and naive, 99-101 naive version, 43, 70 see also Descartes-Euler conjecture, proofs, original problem situation of, 89 refutations perfect formulations of, 28, 43 criticism Poincaré's proof of, 96, 112, 124–5 fake, 15 relations analogous to, 74 and growth, 119 restricted to convex, 30, 32, 44 heuristic, 110 restricted to quasi-convex polyhedra, 63 literary, 147 mathematical, 87 restricted to simple polyhedra, 36 may turn mathematical truth into logical restricted to simple polyhedra with simplyconnected faces, 39, 44, 112 truth, 105-11 of a conjecture, 10 'safe' formulation of, 31-2, 40 crystals, 14 dialectic, 5, 39, 100, 155 accounts for change without criticism, 58 decision procedure, 4, 113 divergent series, 146 deduction dogmatism, 4-5 and the theory of error, 33 generalisation by, 101 as heuristic pattern of mathematics, 152-3 see also scepticism and increased content, 86 dominant theory, 130-3; see Euclideanism and infallibility, 128, 133-4, 146 deductivist style, 151-63 edges definitions, 1 as the boundary of a face, 119 ad hoc, 25 Cayley's definition of, 102 invented by Euler, 6 essentialism in, 20 essentialist versus nominalist theory of, 98, undefined, 113 126-34, 162 education, 151-2 'hidden' clauses of, 23 error, 34, 158 monster-including, 91 essentialism: and the Euclidean programme, Pascal's rules of, 113 of polyhedra, 15-25 in definitions, 20, 126-34 proof-generated, 129-30, 151, 163 modified, 129-30 rigorous, 106 Euclideanism, 113, 129, 146-7, 153 translatory, 129-31 deleterious effect on mathematics, 148 zero, 143 Euclidean style, 151-63 degeneration, mathematical, 163 separates guessing and proving, 146 depth of a proof, 63-4, 102-3, 127 evolution, 4, 24 Descartes-Euler conjecture, 6, 9 exception-barring, 26-32, 44, 62, 70, 89, 92, Becker's version of, 103 141-4, 148



Cambridge University Press & Assessment 978-1-107-11346-6 — Proofs and Refutations Imre Lakatos , Edited by John Worrall , Elie Zahar Index More Information

180

INDEX OF SUBJECTS

exception-barring (cont.)	heuristic, x, 3, 12
as the standard method before	counterexamples, 88, 98–9
Seidel, 144	criticism, 110
Cauchy's method and the revolution in	deductive, 77, 152–3
rigour, 145	dogmas, 40
combined with proof-analysis and lemma-	follows a zig-zag path, 44
incorporation, 40	Hegelian conception of, 151
continuum of methods, 39	helps to ignore refutations, 79
modified, 30	and historical variation, 99–100
	inductive, 77
faces	language dynamics, 98
boundary of, 119	like scientific heuristic, 78
undefined, 113	may deviate from the historical pattern,
see also polyhedra	135
fallibilism, 147	Pappian, 67, 80
finality, 126–34	rules of the method of proofs and
and certainty, 67, 113, 128	refutations, 53, 61, 68, 70, 80, 104
and depth, 127 formalism	and vagueness, 106 versus deductivist approach, 151–63
eighteenth-century, 1, 146	historicism, 57
Hilbert's, 59	Historicism, 57
twentieth-century, 130	ideology, political, 52
four-colour conjecture, 7, 77	incidence matrices, 114, 118, 123–4
Fourier's conjecture, 150, 157	induction: Abel's criticism of, 142
counterexamples to, 157, 159	and analysis, 10
proved and improved by Dirichlet,	as the basis of the method of proofs and
157–9	refutations, 72–4, 95
proved by Cauchy, 157	eighteenth-century inductivism, 146
Fourier series, 138, 141	inductive conjectures and inductive
functions, as monsters, 21–2, 25, 160	heuristic, 77
see also Cauchy's theorem, convergence,	inductivist style, 151
Fourier's conjecture, uniform	infallibilist theory, 160
convergence	see also Euclideanism, fallibilism
	infinite regress, 43, 56
geometry	see also proofs, vicious infinity
analytical, 20	integral
as a 'dominant' theory, 130, 132–3	Cauchy's, 156, 158
Euclidean, 52	Dirichlet's, 158
non-Euclidean, 27, 59, 147	Lesbesgue's, 159
Gödel sentences, 2	Riemann's, 161
Goldbach's conjecture, 77	Riemann's criticism of Cauchy's, 158, 161
graph theory, 98 guessing	Riemann–Stieltjes, 156 textbook presentation of, 129–30
deductive, 98–9	interpretations
deductive versus naive, 74–81	dogmatic versus sceptical, 105
guesswork versus insight, 32	intended and unintended, 89–91
as a heuristic pattern, 99–101	intuitionism, 55, 59
increased content by deductive guessing,	see also language
81–7	intuitions
	as a source of definitions and axioms, 114
Hegelianism, 147	clear and distinct, 129-30
and heuristic, 151	conjectures turned into, 114
can also dialostic Hogolian triad	deductive 147

mature, 54

Hegelian triad, 132-3, 151, 158



Cambridge University Press & Assessment 978-1-107-11346-6 — Proofs and Refutations Imre Lakatos, Edited by John Worrall, Elie Zahar Index More Information

INDEX OF SUBJECTS

knowledge mathematics autonomy of, 155 autonomy of, 155 growth of, 87-9, 99-100, 101 degeneration of, 103, 153 see also conjectures as eternal truth, 151 formalist philosophy of, 1-5 language foundations of, 58 teaching of, ix, 151-3 and the growth of knowledge, 99 and the problem of universals, 98 union with logic, 59 changes in, 99 measure theory, 132-3, 159, 162 formalised, 99 Carathéodory's definition of measurable irrelevant to mathematics, 55 set. 162-3 laws of, 87 outer measure, 162 linguistic precision, 85 mechanics naive versus theoretical, 97 Newtonian, 52 natural language reflects the essence of an rational, 132-3 wave, 130 object, 122 metamathematics, 1, 3, 5, 59 vagueness of, 55 lemma-incorporation, 35-45, 70 and the search for a dominant dogmatist interpretation of, 49-50 theory, 132-3 playing for safety, 61 monster-adjustment, 32-5, 59, 103 rechristened the method of proof and monster-barring refutations, 53 and content, 94 in defence of the theorem, 45 relies on the proof, 44 versus exception-barring, 38 definitions, 104, 106 lemmas, 10 disguised, 151 ad hoc versus suitable, 53 the method of, 15-28, 44, 49, 53, 70, 89 and rigour, 59 discovery of, 54 false, 11 versus exception barring, 31 hidden, 46-50, 59, 135, 140, 143, 154 monsters, 24, 53, 102, 104, 131 improved, 13 examples of, 15-26, 160 trivially true, 42-3, 48-9 see also lemma-incorporation optics, Newtonian, 147 logic ancient, 86-7 paradoxes Bolzano's, 109 inventor's paradox, 72 and deductive infallibility, 147 of set theory, 59 depends upon translation, 131 piecemeal engineering, 42 of discovery, 3, 152-3 playing for safety, 26-32, 40 as the dominant theory, 133-4 polygons, 6 and exception-barring, 26-7 heptagon, 20, 76 inductive, 29, 77 inner, 85, 97-8 informal, 101 multiply-connected, 85, 97-8 informal theorems of, 60 perfect, 81 and language statics, 99 ringshaped, 34, 37, 41, 85, 97-8 logical constants, 132 star, 18-19, 33, 116 systems of, 15-16, 74-6 logical form, 109-10 mathematical, 21-2, 128 triangular, 20, 76 of mathematics, 152 polyhedra, 6 situational, 1, 3-4 almost convex, 64 theory and practice of, 87 boundary of, 107, 119, 126 three-valued, 57 Cauchy, 54, 71 union with mathematics, 59 with cavities, 85, 97, 102 logical positivism, 2, 99 complex, 91

181

logicism, 59

concave and convex, 23, 30, 44, 89, 91-2



Cambridge University Press & Assessment 978-1-107-11346-6 — Proofs and Refutations Imre Lakatos , Edited by John Worrall , Elie Zahar Index <u>More Information</u>

182

INDEX OF SUBJECTS

polyhedra (cont.)	and proof, 53, 87
crested cube, 36-7, 40, 83	reduced to a triviality, 134
cube, 62	and revolution in rigour, 59
cylinder, 24, 30, 45, 50, 56, 85, 88, 102, 105-6,	rigorous, 50
129	safe, 62
defined in vector-algebraic terms, 114, 126	without proof, 53
definitions of, 15–25, 97–8	proof and refutations, rechristened 'the
dodecahedron, 62	method of proofs and refutations', 68
essence of, 113	the dialectical unity of, 39
heptahedron, 116–19	the heuristic rules of, 53, 61–2
Lhuilier's classification of, 97	the method of, 50–3
naive concept of, 105	see also proofs and refutations
nested cube, 14	proof procedure, 112, 152
normal, 81	see also proofs and refutations
n-spheroid, 83	proofs, 7–10
octahedron, 116	changing standards of, 110
one-sided, 88, 103, 116	criticism of, 10–13, 141
open, 103	crystal clear, 55
picture frame, 20, 23, 35, 51, 71, 82, 88	deeper, 60, 67, 70, 127
primitive, 115	different proofs yield different theorems
prisms and pyramids, 90	69–70
regular, 6, 89	domain of, 68
simple, 36, 90, 93, 106, 120	Euclidean, 113
simply-connected, 91, 103, 105, 115, 127	final, 67–9, 102
spherical, 35	formal, 1, 131–2
star, 17–18, 33, 35, 45, 65–6, 90, 96, 103	to improve, 11, 31, 39, 44
tabulated values for F , V , and E , 73	inductive, 146
torus, 36	infinite regress of, 43
triangular, 35	and meaning, 132
twintetrahedron, 16, 28, 85, 103, 106	more rigorous and more embracing, 128
uneigentliche, 17	perfect versus imperfect, 147
polytopes, 115	and proof-analysis, 87
see also polyhedra	proofs ancestor, 163
power series, 141–4	proving after improving, 112
pragmatism, 57	rules of, 60
probability theory, 132–3, 162	as stage in method of proofs and
problems, 6	refutations, 135
one does not solve the problem one has set	as tests, 31
out to solve, 96	that do not prove, 30, 39, 44
problem situation, 153	trivial extensions of, 102
problem to prove, 7, 43	valid, 106
scientific inquiry begins and ends with	without a conjecture, 83
problems, 111	see also proof analysis, proof procedure,
proof-analysis, ix, 45–60, 140	thought-experiment
approximate, 54	proofs and refutations
as a fermenting agent for refutations, 50	and concepts, 95–6
can make proof infallible, 147	discovery of, 144–9
concludes with a proof, 113	logic of, 5
discovery of, 144–50	method of, 68, 89, 135-6, 144
domain of, 68	see also proof and refutations
and lemma-incorporation, 38	proportion, theory of, 132-3
may decrease content, 61	psychologism
no limitations on the tools of, 113	and crystal-clear proof, 55
perfect, 50	versus objectivity, 55



Cambridge University Press & Assessment 978-1-107-11346-6 — Proofs and Refutations Imre Lakatos , Edited by John Worrall , Elie Zahar Index More Information

INDEX OF SUBJECTS

psychology terms: clear and distinct, 129-30 and the context of discovery, 152-3 and counterexamples, 131-2 translated into physiology, 132-3 logical and descriptive, 109-10 perfectly known (formative), 132 rationalism, critical, 4, 57, 72 primitive, 115, 122 rational reconstructions, 5, 90 specific and non-specific, 115, 131 rectifiable curves, 159 technical, 153 refutations: fermenting agents for see also translation proof-analysis, 50 theorem, 57 heuristic, 100 domain of validity, 55, 148 important and unimportant, 92, 104 master-theorem, 67 lack of refutations causes neglect of proof-generated, 54, 93, 135 proof-analysis, 52 versus conjecture, 7-8, 44 logical and heuristic, 98-9 theories proof-generated, 51 formalised, 113 their diminishing returns, 103 growing (informal), 2, 45, 113, 148 theoretical versus naive, 101-5 mature, 45 see also counterexamples method of, 113 thought-experiment, 7, 10, 14-15, 79, retransmission of falsity, principle of, 50, 61, 67 rigour, 45-60 83, 135 Abel's and Cauchy's concept of, 146 deductive, 86 distinct from its linguistic articulation, 54 absolute, 30, 55 Cauchy-Weierstrass revolution in, 59, 128, quasi-experiment, 9 stimulated by counterexamples, 87 connections with more embracing proofs, see also proof topology, 19, 65, 68, 97-8, 102 degrees of, 55, 57 translation: and definitions, 129-30 and Fourier's counterexamples, 139 problem of, 112-23 and proof-analysis, 54-5, 58-60 procedure, 128 and scepticism, 128 some examples, 132-3 sufficient, 57 true translation, 128 see also proofs truth certain, 70 scepticism, 5, 108 retransmission of, 67 and linguistic communication, 54 vacuous, 47 tunnels, 23, 71, 97 religious, 57 and rigour, 128 sceptic turned into dogmatist, 49 uniform convergence, 139-41, 153-5 set theory, 21-2, 59 as a hidden lemma in other proofs, 150 simplicity, 69 discovery of, 141-4 social sciences, methodology of, 155 textbook presentation of, 154 surrender, method of, 14-15 synthesis, 10 verification, 86 as proof thought-experiment, 80 vertices, 6 boundary of, 121 see also analysis sum of, 121 tautologies, theorems as, 132 undefined, 113 Taylor's theorem, 142 vicious infinity, 56-7, 59, 67, 104, 109

183