

## INDEX

- Abrams, Aaron** 29  
affine chart 75  
Akiyama polyhedra 105  
**Alatorre, Darío** 81  
algebraic surface 75  
  singular 85  
alternating group 43  
**Amethyst, Silvana** 85  
Antoine's necklace 135  
**Antonsen, Roger** 93, 153  
Archimedean solid 27, 139  
**Arnoux, Pierre** 155  
**Athreya, Jayadev** 107
- Bachman, David** 37  
**Barnes, Julie** 57  
**Benson, Peter** 35  
billiards 45, 157  
blue shift 17  
Borromean rings 161  
**Bozlee, Sebastian** 75  
braided surface 111  
branched cover 69  
bubble 137  
**Buric, Dina** 119
- calculus, multivariable 113  
Cantor set 119, 135  
**Carter, J. Scott** 111  
Catalan solid 27, 139  
cellular automaton 125  
**Chatterji, Indira** 13  
**Chéritat, Arnaud** 91  
chip firing 63
- Clifford torus 127  
coloring 39, 157  
complex dynamics 51, 99, 101  
complex tree 97  
complex variety 85  
conformal coordinates 53  
**Coulon, Rémi** 11, 135  
crossings, avoiding 93  
cubic differential 107  
curvature 19, 23, 117  
  negative 17, 29, 159  
curve painting 9
- Davis, Diana** 39, 157  
deformation 47, 101  
**Delp, Kelly** 19  
dihedral group 69  
Dini's surface 29  
Dirac belt trick 149  
dodecahedron 43  
**Dorfsman-Hopkins, Gabriel** 17, 101  
duality 109  
dynamical system 81, 119  
  chaotic 99
- Edmark, John** 139  
**Espigulé, Bernat** 97  
eversion  
  cylinder 79  
  handlebody 161  
  sphere 91  
exponential growth 17, 143
- Farris, Frank A.** 53  
**Felzenszwalb, Pedro F.** 63  
**Fenyés, Aaron** 145  
fiber bundle 123  
fractal 51, 135, 153  
  Pythagorean tree 101  
  Rauzy 97  
  two-reptile 35  
**Francis, George K.** 79  
function  
  complex 49, 57, 99, 101  
  cubic 113  
   $\mathbb{Z}^3$ -periodic 145  
fundamental domain 61, 139  
Fundamental Theorem of Arithmetic 59
- Gangl, Herbert** 121  
Gauss-Bonnet Theorem 19, 23  
**Ghrist, Robert** 77  
**Goerner, Matthias** 61  
**Goodman-Strauss, Chaim** 143, 159  
group actions 41, 121  
gyroid 159
- Harriss, Edmund** 23, 131  
Hausdorff dimension 155  
Hilbert space-filling curve 89, 153  
**Holdener, Judy** 89  
**Holroyd, Alexander** 149  
homotopy 79  
Hopf fibration 127  
horoball 13

- Hsu, Catherine** 41
- hyperbolic
- 3-manifold 13, 61, 73
  - 3-space 37, 67, 121
  - surface 17, 25
- hyperbolic plane 47, 65
- Poincaré disk model 47, 65
  - upper hyperboloid model 65
- hyperboloid 131
- iterated function system 97
- Julia set 99, 101
- kaleidoscope 139
- Kent, Autumn** 7
- Kepner, Margaret** 59
- Klein bottle 79, 123
- Klivans, Caroline J.** 63
- knot 7, 69, 103
- Celtic 153
  - trefoil 69
- knotted surface 111
- Labs, Oliver** 117, 133
- Lelièvre, Samuel** 21, 45, 157
- level curve 57
- linear map 97
- Málaga Sabogal, Alba Marina**
- 21, 45, 105
- Mandelbrot set 49
- Matsumoto, Sabetta** 31, 127
- Maynard, Meghan** 17
- Mcshane, Greg** 43, 99
- minimal
- polyhedra 105
  - surface 127, 137, 159
- Miura map fold 95
- Möbius strip 71, 79, 127
- Möbius transformation 55
- Mohanty, Yana** 141
- Muetzel, Bjoern** 141
- Nash-Kuiper  $C^1$  embedding theorem
- 25
- net 27
- Nil geometry 73
- non-abelian group 41
- Novello de Brito, Tiago** 73
- octahedron 107
- origami 95
- parameter perturbation 97, 99, 101, 115
- Paul, Stepan** 29, 113
- Peano space-filling curve 155
- pentagon 115, 157
- 15 families of tiling pentagons 115
- periodic
- billiards 45, 157
  - surface, infinite polyhedral 107
- Perko Pair 103
- Platonic solid 43, 109
- polyhedron 141
- polynomial, cubic 113
- prime decomposition 59
- prime ideal 147
- projection 65, 111, 127
- stereographic 87, 141
- projective
- geometry 47
  - space 75
  - special linear group 55
- pseudosphere 29
- quadratic field, imaginary 55
- quaternions 149
- Rainford, David** 51
- rational map 57
- rational points 133
- recursion 153
- red shift 17
- rhombicosidodecahedron 141
- Riemann zeta function 51
- ring 147
- Robb, Heidi** 35
- ruled surface 131
- Sander, Evelyn** 109
- Schaubroeck, Beth** 57
- Segerman, Henry** 87
- semi-direct product 41
- Séquin, Carlo** 161
- Sharma, Tashrika** 147

**Shmahalo, Olena** 71  
shuffling, card 93  
**Skrodski, Martin** 63  
solenoid, 2-adic 119  
Sol geometry 11, 73  
sphere  
  3D 127  
  high-dimensional 77  
  Sol geometry 11  
spherical geometry 73  
**Stange, Katherine E.** 55  
substitution rule 143  
**Sullivan, Dennis** 9  
**Sümmerrmann, Moritz L.** 69  
surface, cubic 117, 133  
surface, self-intersecting 91  
symmetric group 41  
symmetry 105, 121, 139, 161

**Taalman, Laura** 95, 103, 115  
tessellation. *See* tiling  
Thurston geometries 11, 73  
**Thurston, William** 9, 67;  
  1, 7, 19, 69  
**Tihanyi, Timea** 125  
tiling 65, 115, 153  
  2D 35, 39  
  3D 61, 73  
  3D hyperbolic 121  
  aperiodic 81, 145  
  hierarchical 143

torus  
  3-hole 161  
  flat 21  
  solid 119  
train tracks 9  
translation surface 31  
**Trettel, Steve** 47  
triacontahedron 27  
triangulation 25, 61  
**Trnkova, Maria** 25

uncountability 71  
universe, shape of 17, 37, 43

**Vejdemo-Johansson, Mikael** 123

wallpaper pattern 53  
Weaire-Phelan foam 137  
**Whitney, Glen** 137

**Yackel, Carolyn** 27  
Yoshizawa butterfly 95

zippered rectangle construction 31  
**Zucker, Matt** 65