

Index

- γ , 20
- $\zeta\gamma$, 74
- \approx , 42
- $n!$, 133
- $\binom{n}{k}$, 137
- Acton, Lord, 127
- Adams, John Quincy, 200
- Adams' apportionment method, 200
- Agenda, 43
- Alabama paradox, 203
- American Mathematical Society, 83
- American Statistical Association, 83
- Anonymity
 - in an election with more than two candidates, 23
 - in an election with two candidates, 3
- Apportionment, 192
 - methods
 - Adams', 200
 - Condorcet's, 208
 - d'Hondt's, 208
 - equal proportions, 208
 - greatest divisors, 208
 - Hamilton's, 194
 - Hill's, 205
 - Hill-Huntington, 208
 - Jefferson's, 197
 - largest remainders, 208
 - major fractions, 208
 - smallest divisors, 208
 - Vinton's, 202
 - Webster's, 201
 - Webster-Willcox, 208
- Approval voting, 82, 84
 - strategy, 105
- Arithmetic mean, 205
- Arrow, Kenneth, 60
- Arrow's conditions, 63
- Arrow's Theorem, 64
 - proof of, 74–81
 - strong form, 66, 75
- Associated Press college football poll
 - in 1971, 19
 - in 1994, 19
 - in 2004, 28
- Australian House of Representatives, 45
- Balinski, Michel, 207
- Balinski and Young's Theorem, 207
- Banzhaf III, John F., 128
- Banzhaf index, 129
- Banzhaf power, 129
 - percentages in the 2016 Electoral College, 158
- Banzhaf total power, 129
- Beedham, Brian, 170
- Binary preference matrix, 175
 - symmetric, 176
- Bitwise complement, 176
- Black, Duncan, 55
- Black's voting system, 55
- Board of Supervisors, Nassau County, New York
 - in 1965, 130
 - in 1994, 130
- Borda, Jean-Charles de, 19
- Borda count, 19, 22
- Brams, Steven, 88
- Browne, Harry, 152
- Bullet voting, 97
- Burr, Aaron, 166

- Burying, 97
- Bush, George W., 16, 150
- California
 - proposal to assess a new tax or fee, 6
- California gubernatorial recall election
 - in 2003, 27
- Canada
 - population distribution in 2016, 121
 - procedure to amend Constitution, 121
- Chirac, Jacques, 17
- Choice function, 98
 - dictatorial, 99
 - extending to a voting system, 100
 - manipulable, 98
 - monotone, 100
 - non-imposed, 99
- Churchill, Winston, 73
- Citizen sovereignty, 63
- Citizens of voting age population
 - estimates by state in 2016, 161
- CLC, 38
- Clinton, Hillary, 15, 149
- Coaches' college football poll in 2014, 28
- Coalition, 113
 - losing, 113
 - minimal winning, 113
 - winning, 113
- Coastline paradox, 231
- Coleman, Norm, 36
- College football poll
 - Associated Press
 - in 1971, 19
 - in 1994, 19
 - in 2004, 28
 - Coaches' in 2014, 28
- Combinatorics, 137
- Communities of interest, 220
- Compactness, 220
 - laws in Idaho, 220
 - laws in Iowa, 221
 - laws in Michigan, 221
 - length-width, 221
 - perimeter, 221
- Compromising
 - as a strategic choice, 96
- Condorcet, the Marquis de, 37, 208
- Condorcet completion system, 68
- Condorcet loser, 38
 - criterion, 38
- Condorcet winner, 37
 - criterion, 38
- Condorcet's apportionment method, 208
- Condorcet's paradox, 42
- Congressional districts
 - Illinois' 4th, 222
 - in Maryland, 216
 - in North Carolina, 215
 - in Pennsylvania, 216
- Considerations on Representative Government*, 45
- Constitution, U.S.
 - 14th Amendment, 218, 220
 - 23rd Amendment, 154
 - Article 1, Section 1, 193
 - Article 1, Section 2, 193
- Contiguity, 220
- Contingent ballot, 184
- Conventional rounding, 191
- Convexity coefficient, 230
- Cooper v. Harris*, 218
- Counterfactuals, 226
- Cracking, 216, 217
- Critical voter, 129
- Cruz, Ted, 36
- CWC, 38
- Cyclic societal preferences, 62
- d'Hondt's apportionment method, 208
- Davis v. Bandemer*, 224
- Davis, Gray, 27
- Dichotomous preferences, 105
- Dictator
 - for a choice function, 99
 - in a weighted voting system, 115
 - in an election with more than two candidates, 63
 - in an election with two candidates, 2
- Dictatorship, 2
- Direct democracy, 170
- Divisor apportionment method, 197
- Dummy, 115
- Efficiency gap, 227
- Elector, 151
- Electoral College, 112, 151
 - Banzhaf power percentages in 2016, 158
- Electoral vote totals
 - by candidate
 - in 2000, 165
 - in 2004, 165
 - in 2016, 164

- by state
 - in 2000, 155
 - in 2016, 155
- Elgot, C. C., 121
- Equal proportions apportionment method, 208
- Factorial, 133
- FairVote, 45, 49
- Florida
 - presidential election in 2000, 16, 150, 152
 - vote totals, 16, 152
- France presidential election
 - in 2002, 17
 - in 2017, 36
- Function, 61
- function, 62, 98
- Geometric mean, 205
- Gerry, Elbridge, 218
- Gerrymandering, 218
 - partisan, 219
 - racial, 218
- Gibbard, Allan, 98
- Gibbard-Satterthwaite Theorem, 99
 - proof of, 99–105
- Gill v. Whitford*, 219, 227
- Goldilocks rule, 223
- Gore, Al, 16, 150
- Greatest divisors apportionment method, 208
- Gubernatorial election
 - California recall in 2003, 27
 - Minnesota in 1998, 36
- Gutiérrez, Luis, 223
- Hamilton, Alexander, 166, 193
- Hamilton's apportionment method, 194
- Hare, Thomas, 45
- Harvey, Paul, 42
- Hayes, Rutherford B., 202
- Hill, Joseph, 205
- Hill's apportionment method, 205
- Hill-Huntington apportionment method, 208
- Humphrey, Skip, 36
- Huntington, Edward, 205
- IBI, 86
- Idaho
 - compactness laws, 220
- IIA, 57
- Illinois
 - 4th congressional district, 222
- Imposed rule, 2
- Independence of irrelevant alternatives, 57
- India, president of, 45
- Instant runoff, 45
- Institute for Operations Research and Management Science, 83
- Institute of Electrical and Electronics Engineers, 83
- Intensity of binary independence, 86
- Intensity of voters' preferences, 86
- Iowa
 - compactness laws, 221
- Ireland, president of, 45
- Isomorphic, 114
- Iterative voting, 184
- Jefferson, Thomas, 195
- Jefferson's apportionment method, 197
- Johnson, Gary, 16, 56, 149
- Jospin, Lionel, 17
- Kasich, John, 36
- Kennedy, Anthony, 226
- Kerry, John, 26, 165
- Lacy, Dean, 170
- Largest remainders apportionment method, 208
- Le Pen, Jean-Marie, 17
- Le Pen, Marine, 37
- Lemma, 76
- London, mayor of, 45
- Losing coalition, 113
- LULAC v. Perry*, 226
- Macron, Emmanuel, 37
- Major fractions apportionment method, 208
- Majority, 15
 - criterion, 19, 22
 - rule
 - in an election with more than two candidates, 17
 - in an election with two candidates, 5
- Manipulation
 - of approval voting, 105
 - of choice functions, 98
 - of instant runoff, 96
- Maryland
 - congressional districts, 216

- Matrix, 175
- May, Kenneth, 5
- May's Theorem, 5
 - proof of, 7–10
- McGhee, Eric, 227
- Mean
 - arithmetic, 205
 - geometric, 205
- Michigan
 - compactness laws, 221
- Michigan, presidential election in 2016, 16
- Mill, John Stuart, 45
- Minimal winning coalition, 113
- Minneapolis, mayor of, 45
- Minnesota, gubernatorial election in 1998, 36
- Minority rule, 3
- Mischief voting, 97
- Modified Pareto condition, 82
- Monotonicity
 - for choice functions, 100
 - in an election with more than two candidates, 24
 - in an election with two candidates, 4
- Most Valuable Player, National League, 29
 - vote totals in 2015, 29
 - vote totals in 2016, 29
- Motion, 112
- Nader, Ralph, 16, 56, 152
- Nassau County, New York, Board of Supervisors
 - in 1965, 130
 - in 1994, 130
- National Academy of Sciences, 83, 206
- National League Most Valuable Player, 29
 - vote totals in 2015, 29
 - vote totals in 2016, 29
- Neutrality
 - in an election with more than two candidates, 23
 - in an election with two candidates, 3
- New Hampshire, presidential election in 2016, 15
 - vote totals, 16
- New York, Nassau County Board of Supervisors
 - in 1965, 130
 - in 1994, 130
- New-states paradox, 205
- Niou, Emerson, 170
- Nobel Prize in economic science in 1972, 60
- Non-imposed
 - choice function, 99
- North Carolina
 - congressional districts, 215
- Obama, Barack, 153, 215
- Packing, 216, 217
- Pairwise comparisons voting system, 69
- Pareto, Vilfredo, 65
- Pareto condition, 66
 - modified, 82
- Partisan bias, 226
- Partisan symmetry, 224
- Pascal, Blaise, 138
- Pascal's triangle, 138
- Pennsylvania
 - congressional districts, 216
- Perot, H. Ross, 153
- Pivotal voter
 - in a weighted voting system, 131
 - in the proof of Arrow's Theorem, 77
- Plurality, 18
- Population estimates by U.S. state in 1790, 194
- Population paradox, 204
- Power index, 128
- Power indices
 - Banzhaf, 129
 - Shapley-Shubik, 132
- Preference ballot, 20
- Preference list, 20
- Preference order, 20
- Preference schedule, 21
- Preferences
 - dichotomous, 105
- Presidential election
 - France in 2002, 17
 - France in 2017, 36
 - U.S. in 1800, 152
 - U.S. in 1824, 152
 - U.S. in 1876, 202
 - U.S. in 1992, 153
 - U.S. in 2000, 56
 - in Florida, 16, 150, 152
 - vote totals by candidate, 16
 - vote totals in Florida, 16, 152
 - U.S. in 2016, 56

- in Michigan, 16
 - in New Hampshire, 15
 - Republican primaries, 18, 36
 - vote totals by candidate, 16, 150
 - vote totals by state, 160
 - vote totals in New Hampshire, 16
 - vote totals in Republican primaries, 18
- Proportional representation, 223
- Pushover voting, 97
- Quota
 - in a weighted voting system, 113
 - in an election with two candidates, 6
 - rule, 200
 - system, 6
- Redistricting, 214
- Referendum election, 170
- Regan, Donald, 127
- Republican primaries, U.S. presidential
 - election in 2016, 18, 36
 - vote totals, 18
- Roosevelt, Franklin D., 206
- Rounding, conventional, 191
- Rubio, Marco, 36
- Saari, Donald, 85
- San Francisco, mayor of, 45
- Sanders, Bernie, 27
- Satterthwaite, Mark, 98
- Schwarzenegger, Arnold, 27
- Seats-votes curves, 231
- Secretary-General of the United Nations, 83
- Separability problem, 173
- Separable
 - preferences of a voter, 173
 - proposals with respect to a voter, 173
- Sequential pairwise voting, 41
- Sequential voting in a referendum
 - election, 181
- Set-wise voting, 181
- Shapley, Lloyd, 131
- Shapley-Shubik index, 132
- Shapley-Shubik power, 132
- Shapley-Shubik total power, 132
- Shubik, Martin, 131
- Single transferable vote, 45
- Smallest divisors apportionment method, 208
- Societal preference order, 21
- Spoiler candidate, 17, 56
- Stalin, Joseph, 149
- Standard divisor, 197
- Standard quota, 193
- Stein, Jill, 20, 56, 149
- Stephanopolous, Nicholas, 227
- Stickeyville
 - mayoral election, 1, 95
- Strategic voting, 96
- Strong form of Arrow's Theorem, 66, 75
- Swap, 118
 - robust, 118
- Symmetric binary preference matrix, 176
- Symmetry
 - partisan, 224
- Taylor, Alan, 121
- Tilden, Samuel, 202
- Total power
 - Banzhaf, 129
 - Shapley-Shubik, 132
- Trade, 120
 - robust, 120
- Transitivity, 61
- Trump, Donald, 15, 36, 149, 232
- Twain, Mark, 1
- U.S. citizens of voting age population
 - estimates by state in 2016, 161
- U.S. Constitution
 - 14th Amendment, 218, 220
 - 23rd Amendment, 154
 - Article 1, Section 1, 193
 - Article 1, Section 2, 193
- U.S. population estimates by state in 1790, 194
- U.S. presidential election
 - in 1800, 152
 - in 1824, 152
 - in 1876, 202
 - in 1992, 153
 - in 2000, 56
 - in Florida, 16, 150, 152
 - vote totals by candidate, 16
 - vote totals in Florida, 16, 152
 - in 2016, 56
 - in Michigan, 16
 - in New Hampshire, 15
 - Republican primaries, 18, 36
 - vote totals by candidate, 16, 150
 - vote totals by state, 160
 - vote totals in New Hampshire, 16

- vote totals in Republican primaries, 18
- Unanimity, 66
- Uniform partisan swing, 225
- Union, 178
- United Nations
 - Secretary-General, 83
 - Security Council, 116, 143
- Universality, 63

- Ventura, Jesse, 36
- Veto power, 115
- Vinton, Samuel, 202
- Vinton's apportionment method, 202
- Voting Rights Act, 220, 223
- Voting system, 3, 62
 - quota, 6
 - weighted, 112
 - yes/no, 112
- Voting systems
 - approval voting, 82, 84
 - Black's, 55
 - Borda count, 19, 22
 - dictatorship, 2
 - Electoral College, 112, 151
 - imposed rule, 2
 - instant runoff, 45
 - iterative voting, 184
 - majority rule, 5, 17
 - minority rule, 3
 - pairwise comparisons, 69
 - plurality, 18
 - quota, 6
 - sequential pairwise voting, 41
 - sequential voting, 181
 - set-wise voting, 181
 - single transferable vote, 45
 - weighted, 112
 - yes/no, 112

- Washington, George, 193
- Webster, Daniel, 200
- Webster's apportionment method, 201
- Webster-Willcox apportionment method, 208
- Weight
 - of a coalition, 114
 - of a voter, 112
- Weighted voting system, 112
- Willcox, Walter, 205
- Wilson's Theorem, 82
- Wilson, Robert, 82
- Winner's bonus, 224
- Winner-take-all rule, 152
- Winning coalition, 113
 - minimal, 113
- Yes/no voting system, 112
- Young, Peyton, 207

- Zwicker, William, 121