

# Index

- alternating machines, 2
- arithmetic circuits, 9, 32
- asymptotic complexity, 6, 12
- average case, 27
- bichromatic edge, 33, 43, 60
- binary channel, 10
- binary search, 60
- Boolean circuit. 5
  - depth, 5
  - family of, 6
  - monotone, 6
  - size, 5
- unbounded fanin, 6
- monotone, 22
- Boolean formula, 5
  - size, 5
- Boolean function, 5
  - family of, 6
  - monotone, 5
- bottom-up, 9–10, 30, 58, 61
- certificate, 52
- Chernoff's bound, 50
- circuit approximation, 9
- clique, 2
- colorings, 33
- communication pattern, 11, 24
- complexity classes, 1, 26
- complexity measure, 1, 24
- complexity, 27, 57
- computation model, 27
- computation, 1, 27, 57
- connectivity, 9
- counting arguments, 34
- Cycle, 62
- decision problems, 20
- decomposition, 16
  - size, 16
- density, 44
- device, 2
  - accepting, 27
  - generating, 27
  - separating, 2, 27
- diagonalization, 1
- distributional complexity, 14
- dual, 28
- equivalent, 15
- extension (of a relation), 11
- extension, 44, 47, 54
- flow of information, 2
- function, 16, 18
  - consistent, 18
- game, 11
- gates, 5
- global, 10
- hamiltonian cycle, 62
- history, 11, 21, 24
- information, 38, 41, 43, 48
- inputs, 5
- interpretation, 58
- interval, 43
- Khrapchenko, 8
- kills, 49
- L-good, 47
- Laplace, 32
- Las-Vegas, 13–14, 36
- limitation, 57
- majority, 9, 60
- matrix, 17, 54
- maxterm, 5, 32–33
- min-max theorem, 14
- minimum cover, 4
- minterm, 5, 32–33
- monochromatic rectangle, 16
- Monte-Carlo, 13, 36
- non-uniform, 7, 20, 30, 35
- output, 5
- partial function, 39, 54
- perfect matching, 31
- permutation, 62
- prefix-free, 10, 39
- probabilistic method, 48, 52

probabilistic players, 12  
probability distribution, 13  
projection, 43, 47

quality, 43

R-good, 47  
random function, 37  
random restriction, 9, 43  
random source, 13  
randomized protocol, 12, 35  
rank, 18, 55  
rectangular, 11, 17, 19, 22, 25  
reducible, 15  
reduction, 15, 51, 58  
relation, 10  
restriction, 14, 44  
rounds, 25, 28

search problem, 3, 20, 54  
sequential search, 60  
simple path, 42  
slice, 30, 62  
st-connectivity, 2, 32, 58–59  
st-cut, 33, 61  
st-path, 33, 61  
support, 11, 44  
synchronized protocols, 25

third party, 12  
threshold, 29, 62  
top-down, 2, 9–10, 30, 43, 57, 61  
tradeoffs, 28  
size-depth, 28  
tree complexity, 24

uniform distribution, 38  
uniform players, 20  
universal relation, 34  
universe, 44  
upper bound, 33, 57

weight, 29  
worst case, 27

Yannakakis, 19

# Notational Index

|                            |                         |                         |
|----------------------------|-------------------------|-------------------------|
| $C(P, Q)$ , 22             | $\min(f)$ , 5           | $s(f)$ , 5              |
| $C(R)$ , 11                | $\text{Max}(f)$ , 5     | $S(R)$ , 11             |
| $C(B_1, B_0)$ , 19         | $M_F$ , 17              | $\text{stconn}(l)$ , 42 |
| $C_\lambda(R)$ , 14        | $\text{MC-C}(R)$ , 13   | $\text{supp}(p)$ , 43   |
| <br>                       | <br>                    | <br>                    |
| $d(C)$ , 5                 | $NC^k$ , 7              | $th_k^n$ , 29           |
| $d(f)$ , 5                 | <br>                    | <br>                    |
| $d_m(f)$ , 6               | $(k, l)$ -protocol, 25  | $\text{vector}(l)$ , 42 |
| $D(x, y)$ , 11             | $PL$ , 7                | <br>                    |
| $D_\lambda$ , 14           | <br>                    | $w(x)$ , 29             |
| <br>                       | $Q^\rho$ , 44           | <br>                    |
| $\text{Ext}_{P,I}(p)$ , 43 | <br>                    | $\Gamma$ , 16           |
| $\text{Ext}_{Q,T}(q)$ , 44 | $r^{k,l}(R)$ , 25       | $\Gamma(R)$ , 24        |
| <br>                       | $\bar{R}$ , 11          | $\mu_\Omega(A)$ , 44    |
| $f_k$ , 30                 | $R \equiv R'$ , 15      | $\phi_I$ , 15           |
| <br>                       | $R \leq R'$ , 15        | $\phi_{II}$ , 15        |
| $H(t, k)$ , 45             | $R \leq_\alpha R'$ , 15 | $\psi$ , 15             |
| <br>                       | $R(P, Q)$ , 22          | $\Psi(F)$ , 16          |
| $ID_n$ , 17                | $R(B_1, B_0)$ , 19      | <br>                    |
| $I_{k,n}$ , 17             | $R[f]$ , 19             | <br>                    |
| <br>                       | $R^m[f]$ , 22           | <br>                    |
| $L(F)$ , 5                 | $R_f$ , 19              | <br>                    |
| $L(f)$ , 5                 | $R_f^1$ , 22            | <br>                    |
| $L_m(f)$ , 6               | $R_f^m$ , 22            | <br>                    |
| $\text{LV-C}(R)$ , 13      | $R _I$ , 14             | <br>                    |
| <br>                       | $s(C)$ , 5              | <br>                    |