

Notation Cheat Sheet

1. $+$ Addition
2. $-$ Subtraction
3. $\times, \cdot$ Multiplication
4. $\div, /$ Division
5. $\mathbb{N} = \{1, 2, 3, \dots\}$ Natural Numbers
6. $\mathbb{Z}$ Integers (Zählen)
7. $\mathbb{Q}$ Rational Numbers (Quoziente)
8. $\mathbb{R}$ Real Numbers
9. $\neg$ Not, Negation
10. $\vee$ Or
11. $\wedge$ And
12. $\equiv$ Logically Equivalent (Later: Congruences)
13. $|$ Divides
14. $\Rightarrow$ Implies (If... Then)
15. $\Leftrightarrow$, (iff) If and Only If
16. $\in$ In
17. $\notin$ Not In
18. $\{\}, \emptyset$ Empty Set
19. $\cap$ Intersection (Of Sets)
20. $\cup$ Union (Of Sets)
21. $S^c, \bar{S}$ Set Complement (With Respect to a Universe U)
22. $S - T$ Set Difference
23. $S \times T$ Cartesian Product
24. $\subset$ Subset
25. $\subseteq$ Subset Or Equal
26. $\subsetneq$ Proper/Strict Subset (Subset Not Equal)
27. $\supset$ Contains

- 28. $\supseteq$ Contains Or Equal
- 29. $\supsetneq$ Properly/Strictly Contains (Contains Not Equal)
- 30. $\forall$ For All
- 31. $\exists$ There Exists
- 32. $\exists!$ There Exists a Unique
- 33. $\exists^\infty$ There Exists Infinitely Many
- 34. $\#$ A contradiction
- 35. $\therefore$ Therefore
- 36. $\because$ Since (or Because)
- 37. BWOC By Way of Contradiction
- 38. WLOG Without Loss of Generality
- 39.

$$\begin{aligned} f : \mathbb{R} &\rightarrow \mathbb{N} \\ x &\mapsto \lfloor x \rfloor \end{aligned}$$

Here, f is a function from the real numbers to the natural numbers defined by sending x to the floor of x , that is, $f(x) = \lfloor x \rfloor$ (floor here means drop the decimal).

- 40. $\hookrightarrow$ Injects
- 41. $\twoheadrightarrow$ Surjects
- 42. $\sum_{i=1}^n a_n = a_1 + a_2 + \dots + a_n$ Summation
- 43. $\sum_{i=1}^0 a_n = \sum_{x \in \emptyset} x = 0$ Empty Sum
- 44. $\prod_{i=1}^n a_n = a_1 \cdot a_2 \cdot \dots \cdot a_n$ Product
- 45. $\prod_{i=1}^0 a_n = \prod_{x \in \emptyset} x = 1$ Empty Product
- 46. $\gcd(a, b)$ Greatest Common Divisor of a and b
- 47. $\text{lcm}(a, b)$ Least Common Multiple of a and b
- 48. LDE Linear Diophantine Equations (Seeking integer solutions to an equations over the integers)

49. $a \equiv b \pmod{m}$ a is congruent to b modulo m , $m \mid (a - b)$
50. $:=$ Defined To Be (Is Defined As)
51. $[a] = \{x \in \mathbb{Z} : x \equiv a \pmod{m}\}$
52. $\mathbb{Z}/m\mathbb{Z} = \mathbb{Z}_m = \{[0], [1], \dots, [m-1]\}$, Integers Modulo m
53. If $n = pq$ then $\phi(n) = \phi(pq) = (p-1)(q-1)$
54. $\mathbb{C} = \{x + yi : x, y \in \mathbb{R}\}$ Complex Numbers
55. $x + yi \in \mathbb{C}$ Standard Form of a Complex Number
56. $r(\cos(\theta) + i\sin(\theta)) \in \mathbb{C}$ Polar Form of a Complex Number
57. $\cos(\theta) + i\sin(\theta) = \text{cis}(\theta) = e^{i\theta}$ Complex Exponential
58. $\mathbb{F}$ A field (for us, fields are $\mathbb{Q}, \mathbb{R}, \mathbb{C}, \mathbb{Z}_p$ where p is a prime number)
59. $\mathbb{F}[x]$ The set (ring) of polynomials over a field $\mathbb{F}$
60. x An indeterminate (sometimes called a variable)
61. $f(x) = a_n x^n + \dots + a_1 x + a_0 \in \mathbb{F}[x]$ A polynomial
62. a_i The coefficient of x^i
63. $a_i x^i$ A term of the polynomial $f(x)$.
64. $\mathbb{Z}[x]$ The set (ring) of polynomials over the integers (polynomials with integer coefficients)