I'm not a robot

Alpha math sign

Did you know? Overleaf has a symbol palette for users with premium accounts. Read more here. Note that some of the symbols require loading of the amssymb package, and this information is shown when you hover on the symbol. α A {\displaystyle \alpha A} \alpha A ν N {\displaystyle u N} u N β B {\displaystyle \beta B} \beta B ξ Ξ {\displaystyle \xi } \xi \Xi ɣ Γ {\displaystyle \gamma \Gamma } \gamma \Gamma o O {\displaystyle oO\;} o O δ Δ {\displaystyle \delta \Delta } \delta \Delta π Π {\displaystyle \pi \Pi } \pi \Pi ϵ ε E {\displaystyle \epsilon \varepsilon E\;} \epsilon \varepsilon E ρ ϱ P {\displaystyle \rho \varrho P\;} \rho \varrho P ζ Z {\displaystyle \zeta Z} \zeta Z σ Σ {\displaystyle \sigma \Sigma \;} \sigma \Sigma η H {\displaystyle \eta H} \eta H τ T {\displaystyle \tau T} \tau T θ ϑ Θ {\displaystyle \theta \vartheta \Theta } \theta \vartheta \Theta υ Y {\displaystyle \upsilon \Upsilon } \upsilon \Upsilon ι I {\displaystyle \iota I} \iota I ϕ φ Φ {\displaystyle \phi \varphi \Phi } \phi \varphi \Phi κ K {\displaystyle \kappa K} \kappa K χ X {\displaystyle \chi X} \chi X λ Λ {\displaystyle \lambda \Lambda \;} \lambda \Lambda ψ Ψ {\displaystyle \psi \Psi } \psi \Psi μ M {\displaystyle \mu M} \mu M ω Ω {\displaystyle \omega \Omega } \omega \Omega ← {\displaystyle \leftarrow } \leftarrow ⇐ {\displaystyle \Leftarrow } \Leftarrow → {\displaystyle \rightarrow } \rightarrow ⇒ {\displaystyle \Rightarrow \;} \Rightarrow ↔ {\displaystyle \leftrightarrow } \leftrightarrow ⇔ {\displaystyle \rightleftharpoons } \rightleftharpoons ↑ {\displaystyle \uparrow } \uparrow ↓ {\displaystyle \downarrow } \downarrow ⇑ {\displaystyle \Uparrow \;} \Uparrow ⇓ {\displaystyle \Downarrow } \Downarrow ⇕ {\displaystyle \Leftrightarrow \;} \Leftrightarrow ↕ {\displaystyle \Updownarrow } \Updownarrow ↦ {\displaystyle \mapsto } \mapsto ⟼ {\displaystyle \longmapsto \;} \longmapsto ↗ {\displaystyle earrow } earrow ↘ {\displaystyle \searrow } \searrow ↙ {\displaystyle \swarrow } \swarrow ↖ {\displaystyle warrow } warrow ↽ {\displaystyle \leftharpoonup } \leftharpoonup ⇀ {\displaystyle \rightharpoonup } \rightharpoonup ↼ {\displaystyle \leftharpoondown } \leftharpoondown ⇁ {\displaystyle \rightharpoondown } \rightharpoondown ∞ {\displaystyle \infty \;\;} \infty ∀ {\displaystyle \forall \;} \forall ℜ {\displaystyle \Re } \Re ℑ {\displaystyle \Im } \Im ∇ {\displaystyle abla } abla ∃ {\displaystyle \exists } \exists ∂ {\displaystyle \partial } \partial ∄ {\displaystyle exists } exists ∅ {\displaystyle \emptyset } \emptyset ∅ {\displaystyle \varnothing \;} \varnothing ℘ {\displaystyle wp } wp ∁ {\displaystyle \complement } \complement ¬ {\displaystyle eg } eg ⋯ {\displaystyle \cdots } \cdots □ {\displaystyle \square } \square √ {\displaystyle \surd } \surd ■ {\displaystyle \blacksquare } \blacksquare △ {\displaystyle \triangle } \triangle × {\displaystyle \times } \times · {\displaystyle \cdot } \cdot ÷ {\displaystyle \div } \div ∩ {\displaystyle \cap } \cap ∪ {\displaystyle \cup } \cup ≠ {\displaystyle eq \;} eq ≤ {\displaystyle \leq } \leq ≥ {\displaystyle \geq } \geq ∈ {\displaystyle \in } \in ⊥ {\displaystyle \perp \;} \perp ∉ {\displaystyle otin } otin ⊂ {\displaystyle \subset } \subset ≃ {\displaystyle \simeq } \simeq ≈ {\displaystyle \approx } \approx ∧ {\displaystyle \wedge } \wedge ∨ {\displaystyle \vee } \vee ⊕ {\displaystyle \oplus \;} \oplus ⊗ {\displaystyle \otimes } \otimes □ {\displaystyle \Box } \Box ⊠ {\displaystyle \boxtimes } \boxtimes ≡ {\displaystyle \equiv } \equiv ≅ {\displaystyle \cong } \cong For more information see: List of all mathematical symbols and signs - meaning and examples. Basic math symbols Symbol Symbol Name Meaning / definition Example = equals sign equality 5 = 2+35 is equal to 2+3 ≠ not equal sign inequality 5 ≠ 45 is not equal to 4 ≈ approximately equal approximation sin(0.01) ≈ 0.01,x ≈ y means x is approximately equal to y > strict inequality greater than 5 > 45 is greater than 4 < strict inequality less than 4 < 54 is less than 5 ≥ inequality greater than or equal to 5 ≥ 4,x ≥ y means x is greater than or equal to y ≤ inequality less than or equal to 4 ≤ 5,x ≤ y means x is less than or equal to y ( ) parentheses calculate expression inside first 2 × (3+5) = 16 [ ] brackets calculate expression inside first [(1+2)×(1+5)] = 18 + plus sign addition 1 + 1 = 2 − minus sign subtraction 2 − 1 = 1 ± plus - minus both plus and minus operations 3 ± 5 = 8 or -2 ± minus - plus both minus and plus operations 3 ∓ 5 = -2 or 8 * asterisk multiplication 2 * 3 = 6 × times sign multiplication 2 × 3 = 6 · multiplication dot multiplication 2 · 3 = 6 ÷ division sign / obelus division 6 ÷ 2 = 3 / division slash division 6 / 2 = 3 — horizontal line division / fraction mod modulo remainder calculation 7 mod 2 = 1 . period decimal point, decimal separator 2.56 = 2+56/100 ab power exponent 23 = 8 a^b caret exponent 2 ^ 3 = 8 √a square root √a · √a = a √9 = ±3 3√a cube root 3√a · 3√a · 3√a = a 3√8 = 2 4√a fourth root 4√a · 4√a · 4√a · 4√a = a 4√16 = ±2 n√a n-th root (radical) for n=3, n√8 = 2 % percent 1% = 1/100 10% × 30 = 3 ‰ per-mille 1‰ = 1/1000 = 0.1% 10‰ × 30 = 0.3 ppm per-million 1ppm = 1/1000000 10ppm × 30 = 0.0003 ppb per-billion 1ppb = 1/1000000000 10ppb × 30 = 3×10-7 ppt per-trillion 1ppt = 10-12 10ppt × 30 = 3×10-10 Symbol Symbol Name Meaning / definition Example ∠ angle formed by two rays ∠ABC = 30° measured angle ABC = 30° spherical angle AOB = 30° ∟ right angle = 90° α = 90° ° degree 1 turn = 360° α = 60° deg degree 1 turn = 360deg α = 60deg ′ prime arcminute, 1° = 60′ α = 60°59′ ″ double prime arcsecond, 1′ = 60″ α = 60°59′59″ line infinite line AB line segment line from point A to point B ray line that start from point A arc arc from point A to point B = 60° ⊥ perpendicular perpendicular lines (90° angle) AC ⊥ BC ∥ parallel parallel lines AB ∥ CD ≅ congruent to equivalence of geometric shapes and size ΔABC≅ ΔXYZ ~ similarity same shapes, not same size ΔABC~ ΔXYZ Δ triangle triangle shape ΔABC≅ ΔBCD |x-y| distance distance between points x and y | x-y | = 5 π pi constant π = 3.141592654... is the ratio between the circumference and diameter of a circle c = π·d = 2·π·r rad radians radians angle unit 360° = 2π rad c radians radians angle unit 360° = 2π c grad gradians / gons grads angle unit 360° = 400 grad g gradians / gons grads angle unit 360° = 400 g Symbol Symbol Name Meaning / definition Example x x variable unknown value to find when 2x = 4, then x = 2 ≡ equivalence identical to ≜ equal by definition equal by definition := equal by definition equal by definition ~ approximately equal weak approximation 11 ~ 10 ≈ approximately equal approximation sin(0.01) ≈ 0.01 ∝ proportional to proportional to y ∝ x when y = kx, k constant ∞ lemniscate infinity symbol ≪ much less than much less than 1 ≪ 1000000 ≫ much greater than much greater than 1000000 ≫ 1 ( ) parentheses calculate expression inside first 2 * (3+5) = 16 [ ] brackets calculate expression inside first [(1+2)*(1+5)] = 18 { } braces set ⌊x⌋ floor brackets rounds number to lower integer ⌊4.3⌋ = 4 ⌈x⌉ ceiling brackets rounds number to upper integer ⌈4.3⌉ = 5 x! exclamation mark factorial 4! = 1*2*3*4 = 24 | x | vertical bars absolute value | -5 | = 5 f (x) function of x maps values of x to f(x) f (x) = 3x+5 (f ∘ g) function composition (f ∘ g) (x) = f (g(x)) f (x)=3x,g(x)=x-1 ⇒(f ∘ g)(x)=3(x-1) (a,b) open interval (a,b) = {x | a < x < b} x∈ (2,6) [a,b] closed interval [a,b] = {x | a ≤ x ≤ b} x ∈ [2,6] Δ delta change / difference Δt = t1 - t0 Δ discriminant Δ = b2 - 4ac ∑ sigma summation - sum of all values in range of series ∑ xi= x1+x2+...+xn ∑∑ sigma double summation ∏ capital pi product - product of all values in range of series ∏ xi=x1•x2•...•xn e e constant / Euler's number e = 2.718281828... e = lim (1+1/x)x , x→∞ γ Euler-Mascheroni constant γ = 0.5772156649... φ golden ratio golden ratio constant π pi constant π = 3.141592654... is the ratio between the circumference and diameter of a circle c = π·d = 2·π·r Symbol Symbol Name Meaning / definition Example · dot scalar product a · b × cross vector product a × b A⊗B tensor product tensor product of A and B A ⊗ B inner product [ ] brackets matrix of numbers ( ) parentheses matrix of numbers | A | determinant determinant of matrix A det(A) determinant determinant of matrix A || x || double vertical bars norm AT transpose matrix transpose (AT)ij = (A)ji A† Hermitian matrix matrix conjugate transpose (A†)ij = (A)ji A* Hermitian matrix matrix conjugate transpose (A*)ij = (A)ji A -1 inverse matrix A A-1 = I rank(A) matrix rank rank of matrix A rank(A) = 3 dim(U) dimension dimension of matrix A dim(U) = 3 Symbol Symbol Name Meaning / definition Example P(A) probability function probability of event A P(A) = 0.5 P(A ∩ B) probability of events intersection probability that of events A and B P(A∩B) = 0.5 P(A ∪ B) probability of events union probability that of events A or B P(A∪B) = 0.5 P(A | B) conditional probability function probability of event A given event B occured P(A | B) = 0.3 f (x) probability density function (pdf) P(a ≤ x ≤ b) = ∫ f (x) dx F(x) cumulative distribution function (cdf) F(x) = P(X≤ x) μ population mean mean of population values μ = 10 E(X) expectation value expected value of random variable X E(X) = 10 E(X | Y) conditional expectation expected value of random variable X given Y E(X | Y=2) = 5 var(X) variance variance of random variable X var(X) = 4 σ2 variance variance of population values σ2 = 4 std(X) standard deviation standard deviation of random variable X std(X) = 2 σX standard deviation standard deviation value of random variable X σX = 2 median middle value of random variable x cov(X,Y) covariance covariance of random variables X and Y cov(X,Y) = 4 corr(X,Y) correlation correlation of random variables X and Y corr(X,Y) = 0.6 ρX,Y correlation correlation of random variables X and Y ρX,Y = 0.6 ∑ summation summation - sum of all values in range of series ∑∑ double summation double summation Mo mode value that occurs most frequently in population MR mid-range MR = (xmax+xmin)/2 Md sample median half the population is below this value Q1 lower / first quartile 25% of population are below this value Q2 median / second quartile 50% of population are below this value = median of samples Q3 upper / third quartile 75% of population are below this value x sample mean average / arithmetic mean x = (2+5+9) / 3 = 5.333 s 2 sample variance population samples variance estimator s 2 = 4 s sample standard deviation population samples standard deviation estimator s = 2 zx standard score zx = (x-x) / sx X ~ distribution of X distribution of random variable X X ~ N(0,3) N(μ,σ2) normal distribution gaussian distribution X ~ N(0,3) U(a,b) uniform distribution equal probability in range a,b X ~ U(0,3) exp(λ) exponential distribution f (x) = λe-λx , x≥0 gamma(c, λ) gamma distribution f (x) = λ c xc-1e-λx / Γ(c), x≥0 χ 2(k) chi-square distribution f (x) = xk/2-1e-x/2 / (2k/2 Γ(k/2)) F (k1, k2) F distribution Bin(n,p) binomial distribution f (k) = nCk pk(1-p)n-k Poisson(λ) Poisson distribution f (k) = λke-λ / k! Geom(p) geometric distribution f (k) = p(1-p) k HG(N,K,n) hyper-geometric distribution Bern(p) Bernoulli distribution Symbol Symbol Name Meaning / definition Example n! factorial n! = 1·2·3·...·n 5! = 1·2·3·4·5 = 120 nPk permutation 5P3 = 5! / (5-3)! = 60 nCk combination 5C3 = 5!/[3!(5-3)!]=10 Symbol Symbol Name Meaning / definition Example { } set a collection of elements A = {3,7,9,14},B = {9,14,28} A ∩ B intersection objects that belong to set A and set B A ∩ B = {9,14} A ∪ B union objects that belong to set A or set B A ∪ B = {3,7,9,14,28} A ⊆ B subset A is a subset of B. set A is included in set B. {9,14,28} ⊆ {9,14,28} A ⊂ B proper subset / strict subset A is a subset of B, but A is not equal to B. {9,14} ⊂ {9,14,28} A ⊄ B not subset set A is not a subset of set B {9,66} ⊄ {9,14,28} A ⊇ B superset A is a superset of B. set A includes set B {9,14,28} ⊇ {9,14,28} A ⊃ B proper superset / strict superset A is a superset of B, but B is not equal to A. {9,14,28} ⊃ {9,14} A ⊅ B not superset set A is not a superset of set B {9,14,28} ⊅ {9,66} 2A power set all subsets of A power set all subsets of A A = B equality both sets have the same members A={3,9,14},B={3,9,14},A=B Ac complement all the objects that do not belong to set A A \ B relative complement objects that belong to A and not to B A = {3,9,14},B = {1,2,3},A-B = {9,14} A - B relative complement objects that belong to A and not to B A = {3,9,14},B = {1,2,3},A-B = {9,14} A Δ B symmetric difference objects that belong to A or B but not to their intersection A = {3,9,14},B = {1,2,3},A Δ B = {1,2,9,14} A ⊖ B symmetric difference objects that belong to A or B but not to their intersection A = {3,9,14},B = {1,2,3},A ⊖ B = {1,2,9,14} a∈A element of,belongs to set membership A={3,9,14}, 3 ∈ A x∉A not element of no set membership A={3,9,14}, 1 ∉ A (a,b) ordered pair collection of 2 elements A×B cartesian product set of all ordered pairs from A and B A×B = {(a,b)|a∈A , b∈B} |A| cardinality the number of elements of set A A={3,9,14}, |A|=3 #A cardinality the number of elements of set A A={3,9,14}, #A=3 | vertical bar such that A={x|3