On the the correct pronunciation of certain mathematical statements

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Inequalities, operators, calculus, …

$x > y$	x is greater than y (x is larger than y).
$x \geq y$	x is greater (than) or equal to y.
$x < y$	x is smaller than y.
$x \leq y$	x is smaller (than) or equal to y.
$x > 0$	x is positive.
$x \geq 0$	x is positive or zero; x is non-negative.
$x < 0$	x is negative.
$x \leq 0$	x is negative or zero.

Small Greek letters used in mathematics

Greek alphabet notations

Lower case Greek alphabet

name	symbol	name	symbol	name	symbol
alpha	α	iota	ι	rho	ρ
beta	β	kappa	κ	sigma	σ
gamma	γ	lambda	λ	tau	τ
delta	δ	mu	μ	upsilon	υ
epsilon	ϵ	nu	ν	phi	ϕ
zeta	ζ	xi	ξ	chi	χ
eta	η	omicron	o	psi	ψ
theta	θ	pi	π	omega	ω

Greek Alphabet

[gri:k] ['ælfəbet]

alpha ['ælfə]	iota [aɪ'əʊtə]	['rəʊ]
beta ['bi:tə]	kappa	sigma [sɪgmə]
gamma ['gæmə]	lambda	tau [tɔ:]
delta ['deltə]	mu [mju:]	upsilon ['ʌpsɪ,lɒn]
epsilon [epsɪlən]	nu [nju:]	phi [faɪ]
zeta ['zi:tə]	xi [zaɪ]	chi []
eta ['i:tə]	omicron [əʊ'maɪkrɒn]	psi ['psɪ]
Theta ['θi:tə]	pi [paɪ]	omega ['əʊmɪgə]

α	alpha	β	beta	γ	gamma	δ	delta
ϵ, ε	epsilon	ζ	zeta	η	eta	θ, ϑ	theta
ι	iota	κ	kappa	λ	lambda	μ	mu
ν	nu	ξ	xi	o	omicron	π, ϖ	pi
ρ, ϱ	rho	σ	sigma	τ	tau	υ	upsilon
ϕ, φ	phi	χ	chi	ψ	psi	ω	omega

Capital Greek letters used in mathematics

B	Beta	Γ	Gamma	Δ	Delta	Θ	Theta
Λ	Lambda	Ξ	Xi	Π	Pi	Σ	Sigma
Υ	Upsilon	Φ	Phi	Ψ	Psi	Ω	Omega

$x_n \underset{n\to\infty}{\longrightarrow} 0$	**1.** The limit of *x*, *n* as *n* tends to the infinity equals (is equal to) zero. **2.** The sequence *x*, *n* tends to zero as *n* tends to the infinity. **3.** *x*, *n* tends to zero as *n* tends to the infinity.

$\frac{x}{y} = x \cdot (y^{-1}),$	*x* over *y* equals *x* times *y* minus one.

$X \cup Y = \{x : x \in X \text{ or } x \in Y\}.$	The union of *X* and *Y* equals the set of *x* such that *x* belongs big *X* or *x* belongs big *Y*

$2^x 3^y$	two to the *x* times three to the *y*. two to the power of *x* times three to the power of y.

$A = A^* \iff \forall\ (i,j) : a_{ij} = \overline{a_{ji}}$	The matrix *A* is Hermitian if and only if, for all *i*, *j* we have *a,i,j* equals *a,j,i* bar. The matrix *A* is equal to *A* star if and only if, for all *i*, *j* we have *a,i,j* equals *a,j,i* bar.

S ⇒ T S ⇔ T	S implies T; if S then T S is equivalent to T; S iff T

$(1+2)^{2+2}$	one plus two, all to the power of two plus two

x^2 x^3 x^n	x squared x cubed *x* to the (power of) *n*

5 – 2 = 3 5^{-2} x_{-2}	Five minus two equals three five to the minus two *x* minus two

$\forall\ x \in A\ \dots$	for each [= for every] x in A … for every x belongs to A ….

$\frac{1}{2}$	one half
$\frac{1}{3}$	one third
$\frac{1}{4}$	one quarter [= one fourth]
$\frac{1}{5}$	one fifth
$-\frac{1}{17}$	minus one seventeenth

-0.067	minus nought point zero six seven
81.59	eighty-one point five nine

$-2.3 \cdot 10^6$ $= -2\ 300\ 000$	minus two point three times ten to the six minus two million three hundred thousand

$4 \cdot 10^{-3}$ $= 0.004 = 4/1000$	four times ten to the minus three four thousandths

$\{x \mid \ldots\}$	the set of all *x* such that . . .

$A \cup B$	the union of (the sets) A and B; A union B

$A \cap B$	the intersection of (the sets) A and B; A intersection B

$A \times B$	the product of (the sets) A and B; A times B

$x, y \in A$	(both) x and y are elements of A; . . . lie in A; . . . belong to A; . . . are in A

$x, y \notin A$	(neither) x nor y is an element of A; . . . lies in A; . . . belongs to A; . . . is in A

$A \cap B = \emptyset$	A is disjoint from B; the intersection of A and B is empty.

$x \in A$	x is an element of A x lies in A x belongs to A x is in A

$3 + 5 = 8$ three plus five equals [= is equal to] eight

$3 - 5 = -2$ three minus five equals [= . . .] minus two

$3 \cdot 5 = 15$ three times five equals [= . . .] fifteen

$(2 - 3) \cdot 6 + 1 = -5$ two minus three in brackets times six plus one equals minus five

$4!$ [= 1 · 2 · 3 · 4] four factorial.

$\frac{3}{5} = 0.6$	three divided by five equals zero point six.
$\exists x \in A \ldots$ $\exists! x \in A \ldots$ $\nexists x \in A \ldots$	there exists [= there is] an x in A (such that) . .. there exists [= there is] a unique x in A (such that) . .. there is no x in A (such that) . . .

$\frac{3}{8}$	three eighths

$\frac{26}{9}$	twenty-six ninths

$-\frac{5}{34}$	minus five thirty-fourths

-245	minus two hundred and forty-five

$\frac{1-3}{2+4} = -\frac{1}{3}$	one minus three over two plus four equals minus one third.

$x > 0 \wedge y > 0 \Longrightarrow x + y > 0$	if both x and y are positive, so is $x + y$

$\nexists x \in \mathbf{Q} \quad x^2 = 2$	no rational number has a square equal to two

$\forall x \in \mathbf{R}\, \exists y \in \mathbf{Q} \quad \|x - y\| < 2/3$	for every real number x there exists a rational number y such that the absolute value of x minus yis smaller than two third.

$\sin(x)$	sine x

$\cos(x)$	cosine x

$\tan(x)$	tan x

$\arcsin(x)$	arc sine x
$\arccos(x)$	arc cosine x
$\arctan(x)$	arc tan x
$\sinh(x)$	hyperbolic sine x
$\cosh(x)$	hyperbolic cosine x
$\tanh(x)$	hyperbolic tan x
$\sin(x^2)$	sine of x squared
$\sin(x)^2$	sine squared of x; sine x, all squared
$\frac{x+1}{\tan(y^4)}$	x plus one, all over over tan of y to the four
$3^{x-\cos(2x)}$	three to the (power of) x minus cosine of two x
$\exp(x^3+y^3)$	exponential of x cubed plus y cubed

$p \notin R.$	*p* does not belong to (the set) R. *p* is not in R. *p* is not an element of R. *p* does not lie in R.

$(x+y)\,z+xy$	x plus y in brackets times z plus x, y

$x^2+y^3+z^5$	x saquared plus y cubed plus z to the power of five.

$A=a^2$	Capital a equals small a squared.

$\overline{1-2i} = 1+2i$ $\overline{z}$	The complex conjugate of one minus two *i* equals one plus two *i*. One minus two *i* bar equals one plus two *i*. The conjugate of a complex number z.

$x \leq 0$: x is negative or zero.
$x < 0$: x is negative.
$x \leq y$: x is smaller or equal to y or x is smaller than or equal to y.

$x - y = x + (-y).$	*x* minus *y* is equal to *x* plus, minus *y*

$ax^2 + 2hxy + by^2 = 0 \quad ....(*)$	We consider the equation star: a, x squared plus two h, x,y plus b (times), y, squared is equal to zero.

$B = A - (A - B) = A\left[I - A^{-1}(A - B)\right]$	I minus A minus one times] B equals A [(A minus B) minus (A minus B) equals A times

$\lim_{x \to 0} \frac{f''(x)}{F''(x)} = \lim_{x \to 0} \frac{-e^x}{4} = -\frac{1}{4}.$	The limit as x tends to zero of f two primes of x over big f two primes of x is equal to the limit as x tends to zero of minus exponential x over four which is equal to minus one over four.

$u_{n_1}, u_{n_2}, u_{n_3}, \ldots$	We consider the **subsequence** u,n one, u,n, two, … and so on.

$A \sim B \Longrightarrow e^A \sim e^B$	If A is similar to B, then exponential A is also similar to exponential B. A is similar to B, implies exponential A is similar to exponential B.

$r = \sqrt{x^2 + y^2}$	R equals the square root of x squared plus y squared.

$x^n + y^n = z^n$	x to the n plus y to the n equals z to the n

$(x + y)z + xy$	x plus y in brackets times z plus x y

$cA = \{cx \mid x \in A\}.$	c,A equals the set c times x such that x belongs to A

$A_n = \{x \in A \mid x \leq n\}$	A,n equals to the set of x belongs to A such that x is less or equal to n.

$f(x)$	*f* of *x*

(a, b)	open interval a b.

$[a, b]$	closed interval a b.
$(a, b]$	half open interval a b (open on the left, closed on the right)
$[a, b)$	half open interval a b (open on the right, closed on the left).

$x \leq y$	x is smaller (than) or equal to y.

f'	f dash; f prime; the first derivative of f

f''	f double dash; f double prime; the second derivative of f

$f^{(3)}$	the third derivative of f

$f^{(n)}$	the n-th derivative of f

$\frac{dy}{dx}$	d y by d x; the derivative of y by x

$n \leq x < n+1.$	n is less or equal to x which is strictly less than n plus one.

$-\lvert x\rvert \leq x \leq \lvert x\rvert.$	Minus the absolute value of x is less or equal to x which is less or equal to the absolute value of x.

$\lvert ab\rvert = \lvert a\rvert \cdot \lvert b\rvert.$	The absolute value of *a,b* is equal to the absolute value of *a* times the absolute value of *b*.

$b = x - y:$ $a = x + y$	*b* equals *x* minus *y*. *a* equals *x* plus *y*.

$A \neq \emptyset$	*A* is different from the empty set. *A* is non-empty.

$c = x \cdot y \cdot z$ $c = x\,y\,z$	*c* equals *x* times *y* times *z* *c* equals *x,y,z*

$\sum_{k=1}^{n} cr^k, \quad n = 1, 2, \ldots.$	The sum for *k* from one to *n* of *c* times *r* to the power of *k*. The sum of *c* times *r* to the power of *k*, for *k* from one to *n*

$\left\lVert \frac{A^k}{k!} \right\rVert \leq \frac{\lVert A\rVert^k}{k!}$	The norm of *A* to the power of *k* over *k* factorial is less or equal to the norm of *A* to the power of *k* over *k* factorial.

$$\left\lvert\sum_{k=1}^{n} x_k\right\rvert \leq \sum_{k=1}^{n} \lvert x_k\rvert.$$	The absolute value of the sum for k from one to n of x,k is less or equal to the sum for k from one to n of the absolute value of x,k.

$$\lim_{x\to 1} f(x) = 2$$	The limit of f of x as x tends to one is equal to two.

$$a^{n+1} - b^{n+1} = (a-b)\cdot\sum_{k=0}^{n} a^k b^{n-k}, \quad n = 1, 2, \ldots.$$	a to the power of n pus one, minus b to the power of n plus one equals a minus b times the sum for k from zero to n, of a to the power of k, b to the power of n minus k.

$$x^{-1}$$	x to the minus one x to the power of minus one

$$\sqrt{x}$$	the square root of x.

$$\sqrt[3]{x}$$	the cube root of x.

$$\sqrt[5]{x}$$	the fifth root of x.

$$e^{\pi i} = -1$$	e to the (power of) pi, i equals minus one.

$$h(2x, 3y)$$	h of two x (comma) three y.

$h\left(x,y\right)$	h of x, y

$\prod_{k=1}^{n} A_k = \left(\prod_{k=1}^{n-1} A_k\right) \times A_n$	The product of A,k for k from one to n is equal to the product of A,k for k from one to n minus one times A,n.

$(n+1)! = n! \cdot (n+1),\ n = 0,\ 1,\ 2,\ \ldots$	n plus one all factorial equals n factorial times n plus one, where n equals zero, one, two,…, and so on.

$A = \{x \in R \mid x \leq p\}, \quad A' = \{x \in R \mid x \leq q\}.$	A equals the set of all x in R such that x is less or equal to p.

$(a+b)^n = \sum_{k=0}^{n} \binom{n}{k} a^k b^{n-k}.$	The binomial formula a plus b to the power of n is equal to the sum fro k from zero to n of C,k,n (the binomial coefficient n over k) times a to the power of k times b to the power of n minus k.

$\binom{n}{k} = \frac{n!}{k!\,(n-k)!}$	C,k,n (the binomial coefficient n over k) equals n factorial over k factorial times n minus k factorial. (the binomial coefficient) n over k

$\langle f, g\rangle = \int_a^b f\left(x\right) g\left(x\right) dx$	The inner product of *f* and *g* equals the integral from *a* to *b* of *f* of *x* times *g* of *x* d, *x*.

$\left(\frac{b}{a}\right)^n = \frac{b^n}{a^n}.$	*b* over *a* all to the power of *n* equals *b* to the power of *n* over *a* to the power of *n*.

$\frac{a^n}{a^m} = a^{n-m}$	*a* to the power of *n* over *a* to the power of *m* equals *a* to the power of *n* minus *m*.

$q = \sup M.$	q equals the sup of M.

$$\sum_{k=1}^{n}(x_k - x_{k-1}) = x_n - x_0.$$	The sum for k from one to n of x,k minus x,k minus one equals x,n minus x, zero.

$$\bigcap_{n=1}^{\infty}[a_n, b_n] \neq \emptyset.$$	The intersection of the closed intervals a,n,b,n for n from one to the infinity is nonempty.

$$\frac{a - p^n}{(p+1)^n - p^n}.$$	*a* minus *p* to the power of *n* all over *p* plus one to the power of *n* minus *p* to the power of *n*.

$$1 + \prod_{k=1}^{n} p_k$$	One plus the product of p,k, for k from one to n. One plus the product, for k from one to n, of p,k.

$$\left\lVert \frac{e^{xA} - I}{x} - A \right\rVert \leq \frac{e^{\lVert xA \rVert} - 1 - \lVert xA \rVert}{\lvert x \rvert} = \left(\frac{e^{\lvert x \rvert . \lVert A \rVert} - 1}{\lvert x \rvert} - \lVert A \rVert \right) \longrightarrow 0$$	The norm of exponential x,A minus I over x minus A is less or equal to exponential of the norm of x,A minus one minus the norm of x,A over the absolute value of x which is equal to exponential of the a the sum of the absolute value of a,k to power of p all to power of one over p, times bsolute value of x times the norm of A minus one over the absolute value of x minus the norm of A which tends to

	zero.

$\det(A) = \lambda_1 \lambda_2 ... \lambda_n = \prod_{\lambda_i \in Sp(A)} \lambda_i$	The determinant of A equals the product of lambda,i for i from one to n which is equal to the product of lambda,i, where lambda,i belongs to S,P (the spectre) of A.

$a > 1 \iff a^r > 1$	*a* is strictly larger than one if and only if *a* to the power *r* is strictly larger than one.

$\sqrt[n]{a}$ $\sqrt[5]{a}$	The *n*-th root of *a*. The fifth root of *a*.

$\left(\frac{1}{p^n}\right) < \frac{1}{a}$	One over p to the power of n is strictly less than one over a.

$x_1 + y_i$	x one plus y i

R_{ij}	R, i j capital R subscript i j capital R lower i j (capital) R (subscript) i j; (capital) R lower i j

M_{ij}^k	(capital) M upper k lower i j; (capital) M superscript k subscript i j

$\sum_{i=0}^n a_i x^i$	sum of a i x to the i for i from nought [= zero] to n; sum over i (ranging) from zero to n of a i (times) x to the i.

$\prod_{m=1}^{\infty} b_m$	product of b m for m from one to the infinity; product over m (ranging) from one to the infinity of b m

$\sum_{i=0}^{n} \binom{n}{i} x^i y^{n-i}$	sum of n over i x to the i y to the n minus i for i from nought [= zero] to n.

$(x-y)^{3m}$	x minus y in brackets to the (power of) three m x minus y, all to the (power of) three m.

$\left\lvert \sum a_k b_k \right\rvert \leq \left(\sum \lvert a_k \rvert^p \right)^{1/p} \left(\sum \lvert b_k \rvert^q \right)^{1/q}$	The absolute value of the sum of a,k,b,k is less or equal to the sum of the absolute value of a,k to power of p all to power of one over p, times the sum of the absolute value of b,k to power of q all to power of one over q.

$D(E) = \{x \mid \ \|x\| \leq 1\},$	D of E is equal to the set of all x such that the norm of x is less or equal to one.

$\frac{1}{p} + \frac{1}{q} = 1$	One over p plus one over q equals one.

$e^A = I_n + A + \frac{A^2}{2!} + \frac{A^3}{3!} + \dots + \frac{A^n}{n!} + \dots = \sum_{k=0}^{\infty} \frac{A^k}{k!}.$	Exponential A equals I,n plus A plus A squared over two factorial plus A cubed over three factorial Plus plus A to th power of n over n factorial plus, and so on which is equal to the sum of A to the power of k over k factorial, for k from zero to the infinity.

$\|a+b\|_p \leq \|a\|_p + \|b\|_p.$	The norm of *a* plus *b*, p is less or equal to the the norm of *a*, p plus the norm of *b*, p.

$\|\|f\|\|_p = \left(\int_a^b \|f(x)\|^p dx\right)^{1/p} < \infty.$	The norm of f,p equals the integral from a to b of the absolute value of f of x to the power of p d,x all to the power of one over p, is finite.
$\sup_{t\in[a,b]} \|x_n(t) - x(t)\| \to 0$	The sup, where t belongs to the closed interval a,b, of the absolute value of x,n of t minus x of t tends to zero.
$\lim_{n\to\infty} \|\|\sum_1^n \alpha_i e_i\|\| = \sqrt{\sum \|\alpha_i\|^2}$	The limit as n tends to the infinity of the norm of the sum for I from one to n of alpha, i, e,i which equals the square root of the sum of the absolute value (the modulus) of alpha,i squared.
$F^{-1}(C) = f^{-1}(C) \cup g^{-1}(C)$	Big f to the minus one of C equals f to the minus one of C union g to the minus one of C.

$\emptyset$	The empty set (= set with no elements).

$\overline{f^{-1}(B)} \subset f^{-1}(\bar{B}).$	*f* minus one of B bar is a proper subset of *f* minus one of B bar.

$\lim_{n\to\infty} f(x_n) \neq f(x).$	The limit, as n tends to the infinity, of f of x,n is different from f of x.
$\lim_{n\to\infty} f(x_n) = f(x)$	The limit of f of x,n as n tends to the infinity equals f of x.
$\|\rho(x,Y) - \rho(z,Y)\| \leq \rho(x,z)$	The absolute value of **rho** of x,Y minus **rho** of z,Y is less or equal to **rho** of x,z.

$\frac{d^2y}{dx^2}$	the second derivative of y by x; d squared y by d x squared

$\frac{\partial f}{\partial x}$	the partial derivative of f by x (with respect to x); partial d f by d x

$\frac{\partial^2 f}{\partial x^2}$	the second partial derivative of f by x (with respect to x) partial d squared f by d x squared

∇f	nabla f; the gradient of f

Δf	delta f

$A \subset Y \subset X.$	A is a subset of Y which is a subset of X.

$\sum_{k=0}^{\infty} \frac{A^k}{k!}$	We consider the infinite series: The sum for k from zero to the infinity of A to the power k over k factorial.

$\sum_{n=1}^{\infty} \lVert x_n \rVert < \sum_{n=1}^{\infty} \left(\frac{1}{2}\right)^n = \frac{1}{2}\left(\frac{1}{1-\frac{1}{2}}\right) = 1,$	The sum for n from one to the infinity of the norm of x,n is strictly less than the sum for n from one to the infinity of one half to the power of n which is equal to one half times one over one minus one half which equals one.

$\lVert (I-T)^{-1} \rVert \leq \frac{1}{1-\lVert T \rVert}.$	The norm of I minus T to the minus one is less or equal to one over one minus the norm of T.

$\sup_{A \in \mathcal{A}} \lVert A \rVert < \infty.$	The sup of the norm of A, where A belongs to $\mathcal{A}$, is finite.

$\langle Tx, Y\rangle = \langle x, T^*Y\rangle \; \forall \; x, y \in H.$	The inner product of T x,Y equals the inner product of x, T star Y, for every x,y belong to H.

$A^2 \geq \sum_{j=1}^{n} \int_0^1 \lvert f_j(x)\rvert^2 dx = \sum_{j=1}^{n} 1 = n$	A squared is greater than or equal to the sum for j from one to n of the integral from zero to one of the absolute value of f,j of x squared d x, and this equals the sum for j from one to n of one which is equal to n.

$\dim(\mathcal{M}) \leq A^2.$	The dimension of M is less or equal to A squared. Dim of M is less or equal to A squared.

$f(x) = e_x(f) = \int_0^1 f(y)\overline{G(x,y)}dy \text{ for all } f \in \mathcal{M}.$	f of x equals e,x of f which is equal to the integral from zero to one of f of y G of x,y bar d y, for all f belongs to M.

$\lVert f\rVert_\infty \leq A \lVert f\rVert_p \leq A \lVert f\rVert_2$	The norm of *f*, infinity, is less or equal to A times the norm of *f*, p which is less or equal to A times the norm of *f*, two.

$E_n = \{x : \sup_{A \in \mathcal{A}} \lVert Ax\rVert \leq n\} = \bigcap_{A \in \mathcal{A}} \{x : \lVert Ax\rVert \leq n\}$	E,n is equal to the set of all x such that sup of the norm of A,x, where x belongs to A is less or equal to n which equals the intersection of the sets of all x suxh that the norm of A,x is less or equal to n, where A belongs to $\mathcal{A}$

$\sum_{n=1}^{\infty} \sup_{x \in E^c} \lvert f_n(x)\rvert \leq \sum_{n=1}^{\infty} M_n < \infty$	The sum for n from one to the infinity of sup of the absolute value of f,n of x, where x belongs to E,c is less or equal to the sum for n from one to the infinity of M,n which is finite.

$$\left\Vert \sum_{n=1}^{N} c_n f_n \right\Vert_{\infty}^{2} \leq B^2 \sum_{n=1}^{N} \left\vert c_n \right\vert^2 \leq B^2 \left\vert c \right\vert^2$$	The norm of the sum for n from one to N of c,n,f,n infinity squared is less or equal to B squared times the sum for n from one to N of the absolute value of c,n squared which is less or equal to B squared times the absolute value of c squared.

$\Vert S - S_n \Vert_{\infty} \to 0$ as $n \to \infty$.	The norm of S minus S,n in the infinity tends to zero as n tends to the infinity.

$\int f(x)\, dx$	integral of f of x d x
$\int_a^b t^2\, dt$	integral from a to b of t squared d t
$\iint_S h(x,y)\, dx\, dy$	double integral over S of h of x y d x d y.

$$\Vert f \Vert = \left(\int_X \vert f \vert^p \, d\mu \right)^{1/p}$$	The norm of f equals the integral over X of the absolute value of f to the power of p d,mu all to the power of one over p.

$$\vert gf \vert = gf \text{ and } \left(\frac{\vert g \vert}{\Vert g \Vert_q} \right)^q = \left(\frac{\vert f \vert}{\Vert f \Vert_p} \right)^p \text{ a.e.}$$	The absolute value of g,f equals g,f and the absolute value of g over the norm of g,q to the power of q equals the absolute value of f over the norm of f,p to the power of p, **about every**.

$A \in \mathbb{M}_n(\mathbb{K})$	A belongs to M,n of K. The matrix A belongs to M,n of K.

$e^{-i\theta}$	Exponential minus i, theta.

$$A = \begin{pmatrix} \cos\theta & \sin\theta \\ -\sin\theta & \cos\theta \end{pmatrix}$$	A is a squared matrix of order two defined by A equals cosine theta, sine theta, minus sine theta and cosine theta.

$p_A(x) = \det(A - xI)$	The characteristic polynomial of A : P,A of x is equal to the determainant of A minus x, I.

x_0 x zero; x nought

$A^{-1} = \frac{1}{\det(A)} (Com(A))^t$	The inverse of A (A to the minus one) equals one over the determinant of A times the comatrix of a transpose.

$p_{AB}(\lambda) = p_{BA}(\lambda)$	P,A,B of lambda is equal to P,B,A of lambda, wehere p is characteristic polynomial.

$E_\lambda = \{x \in \mathbb{R}^n \; ; \; Ax = \lambda x\} = \ker(A - \lambda I).$	The eigenspace associated with lambda equals the set of all x belongs to R,n such that A,x equals lambda x, which is equal to the kernel of A minus lambda I.

$f : \mathbb{P}_n[x] \longrightarrow \mathbb{P}_n[x]$, $p \longmapsto f(p) = p'$	*f* is an Endomorphism defined on the vector space P,n of x by *f* of p equals p prime.

$f^2 + 3f + 4id_E = 0$	*f* squared plus three *f* plus four times the identity mapping of E (plus four i,d,E) equals zero.

♦) $\forall\ x \in E : \|x\| \geq 0$, et $\|x\| = 0 \Leftrightarrow x = 0$ ♦) $\forall\ \lambda \in \mathbb{K}, \forall\ x \in E : \|\lambda x\| = \|\lambda\| . \|x\|$ ♦) $\forall\ x, y \in E : \|x + y\| \leq \|x\| + \|y\|$.	For every x in E: the norm of x is positive or zero and the norm of x equals zero if and only if x equals zero For ecery lambda in K and for every x in E: the norm of lambda x equals the absolute value (the modulus) of lambda times the norm of x. For every x,y in E: the norm of x plus y is less or equal to the norm of x plus the norm of y.

$\|x\|_1 = \sum_{i=1}^{n} \|x_i\|\,,\quad \|x\|_2 = \left(\sum_{i=1}^{n} \|x_i\|^2\right)^{\frac{1}{2}}\,,$ $\|x\|_\infty = \max_{1\le i\le n} \|x_i\|\,.$	Let x be a vector. The norm of x, one equals the sum for i from one to n of the absolute value of x,i. The square root of the norm of x, two equals the sum for i from one to n of x,i squared (of the modulus of x.i squared) The norm of x infinity is equal to the max for i from one to n of the absolute value of x,I (of the modulus of x,i).

$\|A\|_1 = \max_j \sum_{i=1}^{n} \|a_{ij}\|\,,\quad \|A\|_\infty = \max_i \sum_{j=1}^{n} \|a_{ij}\|$	The norm of the matrix A, one equals the max over j of the sum for I from one to n of the absolute value of a,i j. The norm of the matrix A infinity equals the max over i of the sum for j from one to n of the absolute value of a i,j.

$\|Ax\| \le \|A\|\,\|x\|\,;\ \forall\ A \in \mathbb{M}_n(\mathbb{K})\,,\ \forall\ x \in \mathbb{K}^n.$	The norm of A,x is less or equal to the norm of A times the norm of x, for all A belongs to M,n of k and for all x belongs to k,n.

$\lozenge)\ \langle x,x\rangle \ge 0 \text{ et } \langle x,x\rangle = 0 \iff x = 0$ $\lozenge)\ \langle x,y\rangle = \langle y,x\rangle\ \ \forall\ x,y \in E$ $\lozenge)\ \langle \lambda x,y\rangle = \lambda\langle x,y\rangle\ \ \forall\ x,y \in E \text{ et } \forall\ \lambda \in \mathbb{R}$ $\lozenge)\ \langle x,y+z\rangle = \langle x,y\rangle + \langle y,z\rangle\ \ \forall\ x,y,z \in E$	The scalar product of x,x is positive or zero and the scalar product of x,x equals zero if and only if x equals zero. The scalar product of x,y equals the scalar product of y,x for every x and y in E. The scalar product of lambda x, y equals lambda times the scalar product of x,y for every x,y in E and lambda in R

	The scalar product of x and y plus z equals the scalar product of x,y plus the scalar product of y,z for every x,y,z in E.

$\langle x, y\rangle = \sum_{i=1}^{n} x_i y_i$	The inner product of x and y is equal to the sum, for i from one to n, of x,i (times) y,i.

$\begin{aligned} p_A(x) &= \det(A - xI) \\ &= \det\left((A - xI)^t\right) \\ &= \det\left(A^t - xI\right) \\ &= p_{A^t}(x)\,. \end{aligned}$	The characteristic polynomial of A: p,A of x is equal to the determinant of A minus x,I. Equals … Equals … Equals p, A transpose of x.

$\begin{array}{rcl} f & : & \mathbb{R}^n \times \mathbb{R}^n \longrightarrow \mathbb{R} \\ (x,y) & \longmapsto & x^t A y \end{array}$	*f* is a mapping from R, n times R, n to R defined by *f* of x,y equals x transpose A, y.

$\Delta f = 0$	the Laplace equation

$\Delta f = \lambda f$	the Helmholtz equation

$\Delta g = \frac{\partial g}{\partial t}$	the heat equation

$\Delta g = \frac{\partial^2 g}{\partial t^2}$	the wave equation

$\lim_{t \longrightarrow 0} \frac{e^{At} - I}{t} = A.$	The limit as t tends to zero of exponential A,t minus i over t equals A.

$$\begin{aligned}\lambda\langle x,y\rangle &= \langle\lambda x,y\rangle=\langle Ax,y\rangle\\ &= \langle x,A^ty\rangle=\langle x,Ay\rangle\\ &= \langle x,\beta y\rangle=\beta\langle x,y\rangle\end{aligned}$$	Lambda times the inner product of x,y equals the inner product of lambda x,y and this equals the inner product of A x,y which equals beta times the inner product of x,y.

$$\left(A^tA\right)^t=A^t\left(A^t\right)^t=A^tA.$$	A transpose A, all transpose equals A transpose A transpose, transpose which equals A transpose, A.

$$\alpha_0A^m+\alpha_1A^{m-1}+\ldots+\alpha_mI$$	Alpha zero times A to the m plus alpha one times A to the m inus one plus … plus alpha m time I.

$$M=\underbrace{\frac{1}{2}\left(M-M^t\right)}_{A}+\underbrace{\frac{1}{2}\left(M+M^t\right)}_{B}$$	The matrix M is always written as the sum of two matrices A and B, where A equals M minus M transpose over two and B equals M plus M transpose over two.

$\mathbb{M}_n(\mathbb{R})=S_n(\mathbb{R})\oplus A_n(\mathbb{R})$	M,n of R is equal to the direct sum of S,n of R and A,n of R.

$(B^t=-B)$	B transpose equals (is equal to) minus B.

$$\begin{aligned}\lambda\langle x,x\rangle &= \langle\lambda x,x\rangle\\ &= \langle Ax,x\rangle=(Ax)^t\overline{x}\\ &= x^tA^t\overline{x}=x^t\left(\left(\overline{A}\right)^t\right)^t\overline{x}\\ &= x^t\overline{A}\overline{x}=x^t\overline{Ax}\\ &= \langle x,Ax\rangle=\langle x,\lambda x\rangle=\overline{\lambda}\langle x,x\rangle\end{aligned}$$	Lambda times the inner product of x,x equals the inner product of lambda x,x which equals the inner product of A x,x and this equals A x transpose, x bar which equals lambda bar times the inner product of x,x.

$A^{-1} = A^*$	A to the minus one equals A star. The inverse of A is equal to A star. The inverse of A equals A star.

$A^{-1} = \frac{-1}{c_0} \sum_{k=1}^{n} c_k A^{k-1}$	A minus one equals minus one over c,zero times the sum for k from one to n of c,k,A to the power k minus one.

$A^k = PB^kP^{-1}$	A to the power of k equals P times B to the power of k times P minus one.

$A^tA = AA^t = I_n$ $A^t = A^{-1}$ $\|\|Ax\|\| = \|\|x\|\|\ ;\ \forall\ x \in \mathbb{R}^n.$ $(Ax)^t\,(Ay) = x^ty\ ;\ \forall\ x, y \in \mathbb{R}^n.$	A transpose, A, equals A, A transpose which is equal to I,n. A transpose equals A to the minus one. The norm of A,x is equal to the norm of x, for all x belongs to R,n. A x transpose A,y equals x transpose, y, for all x and y belong to R,n.

$ax^2 + bx + c$	*a x* squared plus *b x* plus *c*

$\sqrt{x} + \sqrt[3]{y}$	the square root of x plus the cube root of y

$\sqrt[n]{x + y}$	the *n*-th root of *x* plus *y*

$\frac{a+b}{c-d}$	*a* plus *b* over *c* minus *d*

$\binom{n}{m}$	(the binomial coefficient) *n* over *m*