

ABBREVIATIONS AND SYMBOLS

As college students you should develop your own system of shorthand and abbreviations for efficient notetaking during lectures and meetings. This will also help you take good notes on the job. This saves time and allows you to focus more on content. What follows is a list of abbreviations I might use in class.

*	I sometimes use an asterisk to denote an exact quantity. E.g., x^* .
abs	absolute
add'n	addition
alg	algebra / algebraic (on graded exams , this means an “ algebraic error ”)
approx.	approximate, approximation
arith	arithmetic (on graded exams , this means an “ arithmetic error ”)
bc or b/c	because
bw or b/w	between
calc	calculus, calculation
chg(s)	change(s)
col(s)	column(s)
comp(s)	computation(s), computational
cond	condition
const(s)	constant(s)
conv(s)	converge(s), also \rightarrow
cptr	computer
decr	decrease(s)
def	definition
dep	depends, dependent
deriv	derivative
det	determinant of a matrix
diff	difference or differentiate
diff't	differentiate or different
dim(s)	dimension, dimensions
div(s)	division(s)
EE	explicit Euler
E.g., e.g.	for example (Latin: <i>exempli gratia</i>)
Eq or eqn	equation
equiv	equivalent, also \Leftrightarrow or iff
esp.	especially

eval, eval't	evaluate
exp / expl	explicit
ftn	function
IC	initial condition
IE	implicit Euler
I.e., i.e.	that is, namely, in other words, (Latin: <i>id est</i>)
iff	if and only if, also \Leftrightarrow
imp / impl	implicit
incr	increase(s)
ind, indep	independent
int / integ	integral, integrate
inv	inverse, invert
IP	initial point
It, Iter, Iter'n	iterate, iteration
IVP	initial value problem
LHS	left hand side
Liest du das?	German, "Are you reading this?"
ME	modified Euler
mthd(s)	method(s)
mult(s)	multiply, multiplication(s)
NG	Newton-Gregory
no./nos.	number/numbers
not'n	notation (on graded exams , this denotes incorrect or sloppy notation)
ODE	ordinary differential equation (as in MATH-204)
op(s)	operation(s)
poly, polynom	polynomial
pt(s)	point(s)
qty	quantity
rad	radians
rel	relative
res / resid	residual
RHS	right hand side
RK4	classical Runge-Kutta
RKF	Runge-Kutta-Fehlberg
RKV	Runge-Kutta-Verner
rt	right
Simp	Simpson

soln	solution
sp	spelling (on graded assignments or exams , this means an “ spelling error ”)
std	standard
sub(s)	substitute / substitution
subtr	subtract
supp	suppose
sys	system
tang.	tangent
Thm	theorem
TM	trapezoidal method
trig	trigonometric, trigonometry (on graded exams , this denotes trig errors)
trunc	truncation
var(s)	variable(s)
vec(s)	vector(s)
w/ w/o	with and without
wrt	with respect to

Universal (International) Mathematical Symbols

=	equals is the word “is” in English
→	<i>approaches</i> or <i>converges to</i> (Do NOT use as an equal sign =.)
⇒	<i>therefore, implies, leads to</i> . (Do NOT use as an equal sign =.)
⇔	<i>equivalent to</i> , same as iff, means identically the same expressions
	absolute value of a scalar OR determinant of a matrix
	norm (of a vector or matrix in this course)
≡	a mathematical definition, “means”
∈	<i>element of, member of, belongs to</i>
Δ	<i>difference</i> or <i>change</i> in our course (read “delta”)
×	used to denote the size of a matrix, as in a 10×7 matrix (read “10 by 7”)
[]	closed interval notation, <i>includes</i> endpoints, sometimes extra parentheses also denotes a matrix
()	open interval notation <i>excludes</i> endpts / pt notation / or just parentheses
{ }	set notation, sometimes used as extra parentheses
d vs. ∂	in the context of differentiation: d is a total deriv., ∂ is a partial deriv. d and ∂ (read “del”) are not the same and cannot be used interchangeably
\mathcal{O}	<i>order, on the order of</i> , read “big Oh”
\mathbb{R}	1-dimensional real number system

Notes on Symbols: = → ⇒ and ⇔

1. = The equal sign is well understood but often abused by students.
In an equation, it represents the English word “is.”
2. → *Converges to or approaches*. It is **NOT** the equal sign, nor is it the ⇒ symbol.
3. ⇒ *Therefore, so, then, implies*, or “*as a consequence*.” This is the *imply* symbol.
4. ⇔ Equivalent. Connects two expressions (statements) that are equivalent or have identical meaning. It represents “if and only if” in logic.

Examples:

1. $x = 3$ x is 3.
2. $x \rightarrow 3$ x approaches 3, or x converges to 3.
3. $2x - 8 = 0 \Rightarrow x = 4$. 2 times x minus 8 is 0. Therefore x is 4.
4. Thm: Rain \Rightarrow Clouds. Rain implies clouds. If it’s raining, then clouds must be present.
In this case, \Leftrightarrow cannot be used because the converse is not always true.
5. Thm: Unemployed \Leftrightarrow Jobless. Being unemployed and being jobless are equivalent.
I.e., unemployed \Rightarrow jobless AND jobless \Rightarrow unemployed.
6. $PV = mRT \Leftrightarrow PV/T = mR$. These are equivalent statements for an ideal gas.
It is **incorrect** to write $PV = mRT = PV/T = mR$ or $PV = mRT \rightarrow PV/T = mR$.

7. Indicate whether each statement is TRUE or FALSE:

- | | |
|---|-------|
| a) $x^2 = 4 \Rightarrow x = 2$. | False |
| b) $x^2 = 4 \Rightarrow x = \pm 2$. | True |
| c) $x = 2 \rightarrow x^2 = 4$. | False |
| d) $x = 2 \Rightarrow x^2 = 4$. | True |
| e) $x = 2 \Leftrightarrow x^2 = 4$. | False |
| f) $x = 2 = x^2 = 4$. | False |
| g) I will never write code in my career.
(You can’t say that with 100% certainty.) | ???? |
| h) My engineering prof said I’ll never use this.
(Perhaps another prof <i>did</i> say that, but does that person know your future? No.
That’s a presumptuous and very harmful statement to say to a student.) | ???? |
| i) Profs with PhDs are experts in their field. | True |
| j) My profs know everything about their field. | False |
| k) My profs know a <i>lot</i> more than I do. | True |
| l) I’m special. | True |

(... just like everyone else.)