Abbreviations and Symbols

As college students you should develop your own shorthand and abbreviation system. Doing so will help you take good notes in college and on the job. This saves time and allows you to focus more on content. These are the abbreviations I will use in class. Many should be self-explanatory.

abs	absolute
add'n	addition
adj	adjacent
alg	algebra (on graded exams, this means an "**algebraic error**")
arb.	arbitrary
asymp	asymptote
bc or b/c	because
bw or b/w	between
Cart	Cartesian
chg(s)	change(s)
comp(s)	component(s)
const(s)	constant(s)
conv(s)	converge(s), also $\rightarrow$
coord(s)	coordinate(s)
ctr'd	center, centered
cyl	cylinder, cylindrical as in "cyl coords"
def	definition
dep	depends, dependent
deriv	derivative
diff	difference or differentiate
diff'l	differential like dx, dy, etc.
diff't	differentiate or different
dim, dim'l	dimension, dimensional
dist	distance
e.g.	for example (Latin: *exempli gratia*)
Eq or eqn	equation
equiv	equivalent, also $\Leftrightarrow$ or iff
eval, eval't	evaluate
ftn	function
hyp.	hyperbola, hyperbolic / hypotenuse
ident	identity
i.e.	that is, namely, in other words, (Latin: *id est*)

iff	if and only if, also $\Leftrightarrow$
ind, indep	independent
int	integral, integrate
L′	L′Hospital's rule
LHS	left hand side
mthd	method
multiv	multivariate
no./nos.	number/numbers
not'n	notation (on graded exams, this denotes **incorrect or sloppy notation**)
opp	opposite
ortho	orthogonal
par'l	parallel, also $\parallel$
par.	partial (as in par. deriv $\equiv$ partial derivative)
parab	parabola, parabolic
par, param	parameter, parametric
perp	perpendicular, also $\perp$
proj	projection, project (noun), project (verb)
pt(s)	point(s)
Pyth.	Pythagorean
qty	quantity
rad	radians or radius or radial (as in rad coords $\equiv$ radial coordinate)
rect	rectangle, rectangular as in "rect coords"
RHS	right hand side
rt	right
sfc	surface
soln	solution
spher	spherical as in "spher coords"
std	standard
sub	substitute
subtr	subtract
supp	suppose
symm	symmetric, symmetry
sys	system
Thm	theorem
trig	trigonometric, trigonometry (on graded exams, this denotes **trig errors**)
var(s)	variable(s)
vec(s)	vector(s)

wrt   with respect to

Universal/International Mathematical Symbols

$=$	equals is the word "is" in English
$\rightarrow$	approaches or converges to
$\Rightarrow$	therefore, implies, leads to. Formerly $\therefore$
$\Leftrightarrow$	equivalent to, same as iff, means identically the same expressions
$\parallel$	parallel, also par'l
$\perp$	perpendicular, also perp
$\equiv$	a mathematical definition, "means"
$\in$	element of, member of, belongs to
$\subset, \subseteq$	subset of
Δ	difference or change (read "delta")
∇	gradient derivative operator (read "del" or "grad")
$\times$	cross product of two vectors
$\langle\ \rangle$	vector delimiters called angle brackets
$[\ \ ]$	closed interval notation, *includes* endpoints, sometimes extra parentheses
$(\ \ )$	open interval notation *excluding* endpts / pt notation / or just parentheses
$\|\ \ \|$	absolute value of a scalar / magnitude of a vector
$\{\ \ \}$	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
R	1-dimensional real number system
R^2, R^3	2- and 3-dimensional real space

Notes on Symbols: $=$ $\rightarrow$ $\Rightarrow$ and $\Leftrightarrow$

1. $=$ The equal sign is well understood but often abused. It is the English word "is".

2. $\rightarrow$ Converges to or approaches. It is **not** the equal sign, nor is it the $\Rightarrow$ symbol.

3. $\Rightarrow$ Therefore, so, then, implies, or "as a consequence". This is the *imply* symbol.

4. $\Leftrightarrow$ Equivalent. Connects two expressions (statements) that are equivalent or have identical meaning.

Examples:

1. $x = 0$ x is 0.

2. $x \rightarrow 0$ x approaches 0, or x converges to 0.

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: Female $\Leftrightarrow$ Girl.   Female and girl are equivalent. I.e.,

    Female $\Rightarrow$ girl   AND   Girl $\Rightarrow$ female.

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) $x = 2 \Rightarrow x^2 = 4$.   True

    d) $x = 2 \Leftrightarrow x^2 = 4$.   False

    e) $x = 2 \rightarrow x^2 = 4$.   False

    f) $x = 2 = x^2 = 4$.   False