

MATHEMATICS USED IN PH575

PH575 will make use of some basic tools of undergraduate mathematics. Knowledge of advanced mathematics is not necessary. The mathematics should not be a barrier to your understanding; it is more likely that issues of notation rather than issues of substance are the barrier. Please see the instructor if you have any problems.

(1) Coordinate systems

Cartesian (x, y, z) , spherical polar (r, θ, ϕ)

(2) Differential and integral calculus

derivatives, integrals (line, surface, and volume), simple differential equations

(3) Vector analysis

scalar (dot) products, vector (cross) products, gradients

(4) Trigonometry

sine and cosine functions, trigonometric identities

(5) Linear Algebra

matrices, determinants, eigenvalues and eigenfunctions

(6) Complex numbers

real and imaginary parts, absolute values, complex exponential
($e^{i\alpha} = \cos \alpha + i \sin \alpha$; $e^{i\alpha} + e^{-i\alpha} = 2 \cos \alpha$, *etc.*)

(7) Power series and approximations

$\sin \alpha = \alpha + \dots$, $\cos \alpha = 1 - \alpha^2/2 + \dots$, *etc.*