

9709 rarely asks for a definition outright, but the command words assume exact meanings and the proof questions are marked on precise statement. These are the terms whose imprecision costs marks. 9709 很少直接考定义, 但指令词与证明题都要求表述精确。

Functions and algebra

Function 函数 — a rule assigning exactly one output to each element of the domain

One-one function 一一映射 — a function where no two different inputs give the same output; only a one-one function has an inverse

Domain and range 定义域与值域 — the domain is the set of permitted inputs; the range is the set of outputs actually produced

Inverse function 反函数 — the function reversing another; its domain is the RANGE of the original, and its graph is the reflection in $y = x$

Composite function 复合函数 — $fg(x)$ means apply g first, then f ; it is defined only where the range of g lies inside the domain of f

Discriminant 判别式 — $b^2 - 4ac$; positive gives two distinct real roots, zero a repeated root, negative none – and zero is the condition for tangency

Calculus

Derivative 导数 — the instantaneous rate of change of y with respect to x , the limit of the gradient of a chord

Stationary point 驻点 — a point where the derivative is zero; classifying it as maximum, minimum or inflection is a separate step

Increasing function 增函数 — a function whose derivative is positive throughout the interval

Definite integral 定积分 — the limit of a sum, equal to the signed area between the curve and the x -axis over the interval

Indefinite integral 不定积分 — the family of antiderivatives of a function, written with an arbitrary constant $+ c$

Sequences, series and proof

Arithmetic progression 等差数列 — a sequence in which each term differs from the previous by a constant common difference

Geometric progression 等比数列 — a sequence in which each term is a constant multiple of the previous; the sum to infinity exists only when $|r| < 1$

Convergent series 收敛级数 — a series whose partial sums approach a finite limit

Necessary and sufficient 必要与充分 — a necessary condition must hold for the statement to be true; a sufficient condition guarantees it – an exam question asking for one is not asking for the other

Counter-example 反例 — a single case satisfying the hypothesis but not the conclusion, which is enough to disprove a general statement

Statistics and mechanics

Random variable 随机变量 — a variable whose value is the numerical outcome of a random process

Independent events 独立事件 — events where $P(A \cap B) = P(A)P(B)$, so one occurring does not change the probability of the other

Binomial distribution 二项分布 — the distribution of the number of successes in a fixed number of independent trials with constant success probability

Normal distribution 正态分布 — a continuous symmetric distribution defined by its mean and variance, standardised with $z = (x - \mu)/\sigma$

Resultant force 合力 — the single force equivalent to the vector sum of all forces acting on a body

Equilibrium 平衡 — the state in which the resultant force is zero, so the body is at rest or moving with constant velocity

Coefficient of friction 摩擦系数 — the ratio of limiting friction to the normal reaction between two surfaces