

9231 is marked on complete statement more than on arithmetic. A proof missing its assumption, an eigenvector without its eigenvalue, a series without its interval of validity – each loses marks the working had already earned. 进阶数学重在表述完整: 归纳假设、特征值、收敛区间缺一不可。

Proof

Omitting the base case in induction, or verifying it for the wrong starting value.

Not stating the inductive assumption explicitly. ‘Assume true for $n = k$ ’ is a mark on its own.

Ending an induction without the concluding statement that it therefore holds for all n .

Proving a statement by verifying several cases. Examples never prove a general claim, though one counter-example disproves it.

Using what is to be proved somewhere in the proof.

Matrices and complex numbers

Quoting an eigenvector without its eigenvalue, or scaling it and treating that as a different answer.

Confusing an invariant line with a line of invariant points. Every point being fixed is the stronger condition.

Multiplying matrices in the wrong order. Matrix multiplication is not commutative and the transformation order matters.

Giving an argument outside the principal range, or forgetting that a negative real part changes the quadrant.

Finding one root of $z^n = w$ and stopping. There are n roots, equally spaced by $2\pi/n$.

Using De Moivre’s theorem for a non-integer power without justifying the branch.

Series, calculus and mechanics

Quoting a Maclaurin series without its interval of validity when asked.

Applying the method of differences without showing the cancellation, so the telescoping is not visible.

Using a reduction formula without stating the base case of the recursion.

Forgetting that a hyperbolic identity differs in sign from its trigonometric analogue: $\cosh^2 x - \sinh^2 x = 1$.

Applying conservation of momentum across an impact and forgetting the restitution equation, which is the second equation needed.

Taking the coefficient of restitution outside 0 to 1, or applying it perpendicular to the line of impact.

Statistics

Stating hypotheses about the sample statistic rather than the population parameter.

Choosing a one-tailed test after seeing the data.

Concluding ‘accept H_0 ’. We fail to reject; the distinction is marked.

Integrating a probability density function over the wrong interval, or forgetting that the total area must be 1.