

STEP II, 2017, Q6 EC

This question was relatively popular, but it turned out to be one of the hardest of the pure questions. The first part was a reasonably standard example of induction but nearly all candidates failed to understand the subtlety of what was required in the last part. Most candidates made significant progress with part (i), clearly being familiar with the process of induction. However, the algebra to complete the proof was too much for most candidates. Inequalities were frequently handled poorly and the general presentation of logical arguments was unclear with many candidates assuming what was required and not making implications clear. Attempts which brought in calculus were rarely relevant and even less frequently correct.

In the second part, candidates tended to overcomplicate the question. Squaring up (since both sides are clearly positive) and expanding brackets was all that was required. It would have been nice if students had shown some awareness that the squaring process was valid since both sides were positive, however if we had required this it would have effectively been a one mark penalty for all candidates.

In the final part candidates often considered S_1 to find a necessary bound on C . However, further work – usually an induction using their guess – was required to show that this bound works for all n . Many candidates seemed unaware that this final stage was required.



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