

STEP II, 2024, Q8 EC

Question 8

This question was attempted by approximately half of the candidates.

In part (i) candidates were often able to produce the necessary algebra, but some did not justify the strictness of the inequality or failed to use a full inductive structure for the proof. There was a roughly even split between candidates who identified that x_0 could be used as a bound in order to apply the given result and those who incorrectly used the fact that $y_n < x_n$. When considering the behaviour of $(x_n - y_n)$ some candidates incorrectly asserted that the fact that the sequence is bounded below by 0 is sufficient to show that the sequence tends to 0. Almost all candidates were able to show that this result implies that the two sequences tend to the same limit.

In part (ii) most candidates were able to apply the substitution, but some did not justify the new values of the limits or comment on the evenness of the integrand. The evaluation of the final integral was generally done well.



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