

STEP III, 2024, Q2 EC

Question 2

Three quarters of the candidates attempted this question with a mean score of just under half marks.

In part (i), candidates often omitted a justification that the LHS of the inequality was real and for noting that both sides are positive before squaring.

Part (ii)(a) was generally done quite well, although some candidates ignored the suggested method and argued that because the lead terms cancel as $x \rightarrow \infty$, $f(x) \rightarrow 0$, not earning full marks.

The sketch in (ii)(b) was not generally done very well. In general, sketches just need to have the same key features as the actual plot of the function. The asymptotes and symmetry about $x = 1$ were crucial here.

Part (iii) was done fairly well by those that attempted it, most noticing that they should choose values of m to ensure that the x^2 terms should cancel.

There were not many significant attempts on part (iv). To start, it was relatively straightforward to state that as four critical values were required, the quadratic needed to cross the x -axis, but this was often missed. However, there were some very efficient and neat solutions to this part, and candidates who got on the right path initially executed it well. The most common error was failure to get the four roots attached to the correctly signed version of the quadratic. Candidates who used a diagram were generally much more successful with this.



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