

STEP II, 2017, Q4 EC

This is the first question where the difference between “attempts” and “serious attempts” arises to any significant extent: there were just over 800 of the former but well under 500 of the latter. This is also a good point at which to raise a key issue in respect of *strategy* for candidates sitting a STEP. Spending a few minutes of reading time, at some particular time during the examination, could be a significant asset, especially to those candidates who have particular strengths and weaknesses to play to or to avoid. A very brief analysis of this question, on first reading, should help one recognise that a result is being **given** (with no requirement to establish it in any way) and all that is required is to use it. Part (i) then clearly directs part of the way, and the required limits are rather obviously flagged, as is the fact that $g(x)$ must be something to do with the exponential function. One of the two functions to be used in (ii) is also given, as are the limits; an inspection of the **given** should lead to the (correct) conclusion that $g(x)$ *must* be $e^{-\frac{1}{4}x^2}$. Getting just this far takes the candidate to the 10-mark point, a perfectly good return for a candidate who has read the question through sufficiently carefully to realise that it has decent potential for mark-acquisition.

In the final part of the question some careful thought was needed, with only the required limits obvious at first glance. Most attempts, serious or otherwise, picked up the majority of their marks in (i) and (ii) and efforts at (iii) were very varied: many candidates simply gave up and moved on; many more picked up a few extra marks by setting $g(x) = \sqrt{\sin x}$ (which is a fairly obvious candidate to try) and working towards the right-hand half of the given result. Very few candidates indeed had the experience to realise that $\sqrt{\sin x}$ now needed to appear as the squared term, which also meant that a cosine term had to be involved.



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