

## STEP III, 2005, Q1 EC

- 1 This question was surprisingly unpopular, given that it was the first question on the paper – perhaps the sight of unfamiliar trigonometric graphs put candidates off. The first two parts were very poorly done: for the first result almost all only showed that  $A = (4n + 1)\frac{\pi}{2} \pm B$  was sufficient for  $\sin A = \cos B$ , while in the second many looked for turning points but assumed without comment that the maximum of the modulus of a function must occur at the maximum of the function. Almost all could then use these results to show that  $\sin(\sin x) = \cos(\cos x)$  had no solutions. The first two graphs were usually correctly sketched, though many had cusps on one or other curve, but the graph of  $y = \sin(2\sin x)$  was very often attempted

without further calculation and almost always then had a maximum at  $x = \frac{\pi}{2}$  instead of a minimum there and maxima either side of this. Candidates should be aware that graph sketches in STEP papers will often require considerable working, such as determining turning points and their nature, even if this is not explicitly indicated in the question.



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