

STEP III, 2013 , Q1 EC

1. Most candidates attempted this question, making it the most popular and it was also the most successful with a mean score of about two thirds marks. The first two standard results caused few problems, nor did the integration, but some struggled to simplify to the single inverse tan form. In the final part, common errors were failure to reduce to the $n = 0$ case, confusion with the index e.g. $I_n + 2I_{n-1} = \int_0^{\frac{1}{2}\pi} \sin^n x dx$ instead of the correct result, or for those that were more successful, algebraic inaccuracies let them down. Some attempted a recursive formula to evaluate $\int_0^{\frac{1}{2}\pi} \sin^n x dx$ with varying success. Most attempting the last part saw the connection between I_0 and the main result of the question.



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