

## STEP II, 2024, Q3 EC

### Question 3

This question was attempted by approximately three-quarters of the candidates, but only a few were able to achieve a fully complete solution to the question. This question was one where a diagram was very helpful and approaches that were supported by geometrical understanding were generally more successful than attempts that relied solely on algebra.

Part (i) was very well done, but candidates who used geometrical arguments generally did not address cases not covered by their diagram – usually this was the case where the value of  $\theta$  was negative.

Part (ii) was also done well, but some candidates failed to give enough working to support their answer in (a), which is very important in questions where the answer is given. Similarly, in (b) a number of candidates did not show clearly how they interpreted their algebraic work to reach a geometrical description.

Part (iii) was found to be difficult by a large number of candidates. Part (a) was generally done well, although some care with the algebra and exact trigonometric values was needed. Many were then unable to identify a relationship between  $f_3$  and the previously seen functions and did not reach a correct geometrical description in words. A small number did well on part (c) and were able to interpret the inverse of function  $f_2$  geometrically, but very few reached a fully simplified geometrical transformation.



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