

## STEP III, 2022, Q3 EC

### Question 3

This was very popular, being attempted by over 90%, but not very successfully, with a mean score of about 5.5/20. In part (i), candidates generally obtained a correct equation for  $x$  or  $y$ , but then failed to properly justify the manipulation of the inequality. Whilst the quartic was frequently correctly obtained in part (ii), there were a number of different incorrect assumptions or assertions made regarding the two stationary points being repeated roots or the value of the quartic having different signs at the two stationary points. It was also common that the case when  $c$  is negative was not considered. Whilst it was not uncommon for candidates to argue incorrectly for part (iii) that the three equations were equivalent to the curve  $C_2$  in part (ii) having one stationary point, (often using  $\frac{dy}{dx} = \frac{0}{0}$ ), in contrast, a pleasing number of candidates who made little progress in (ii) past obtaining the quartic, approached part (iii) by simply attempting to solve the equations by elimination, earning full or close to full marks.



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