

## STEP II, 2023, Q7 EC

### Question 7

Most candidates were successful in the first two parts, with marks being lost mostly due to the small inaccuracy of forgetting the square root in the expression for the modulus of a complex number.

Part (iii) was also typically done well, with most candidates picking up the idea of dividing by 5, however with mixed accuracy on the other factor. The candidates who picked up that the other factor can be written as a sum of squares were mostly successful in this part, as were almost all the candidates who attempted part (iv).

Parts (v) and (vi) discriminated between candidates, with many successfully getting through (i)-(iv) with full marks but unfortunately making little to no progress on these two. Many failed to spot the decompositions  $1001^2 + 9^2$  in (v) and  $1001^2 + 6^2$  in (vi). The candidates who found these got access to the marks, though many didn't manage to find three solutions in part (v). This was from either overlooking the Pythagorean triple of (3, 4, 5) or the simpler solution obtained by noting that 25 is the square of 5. In part (vi), many candidates either chose the wrong complex number and did not try another one or by failed to notice that 10028 or 2943 are divisible by 109.



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