



STEP II, 2008, Q1

- 1 A sequence of points $(x_1, y_1), (x_2, y_2), \dots$ in the cartesian plane is generated by first choosing (x_1, y_1) then applying the rule, for $n = 1, 2, \dots$,

$$(x_{n+1}, y_{n+1}) = (x_n^2 - y_n^2 + a, 2x_n y_n + b + 2),$$

where a and b are given real constants.

- (i) In the case $a = 1$ and $b = -1$, find the values of (x_1, y_1) for which the sequence is constant.
- (ii) Given that $(x_1, y_1) = (-1, 1)$, find the values of a and b for which the sequence has period 2.



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