

Let $A_1A_2\ldots A_{3n}$ be a closed broken line consisting of $3n$ line segments in the Euclidean plane. Suppose that no three of its vertices are collinear, and for each index $i = 1, 2, \ldots, 3n$, the triangle $A_iA_{i+1}A_{i+2}$ has counter-clockwise orientation and $\angle A_iA_{i+1}A_{i+2} = 60^\circ$, using the notation $A_{3n+1} = A_1$ and $A_{3n+2} = A_2$. Prove that the number of self-intersections of the broken line is at most $\frac{3}{2}n^2 - 2n + 1$.