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From doodles to diagrams to knots.

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Summary: What closed curves can be drawn in the plane such that they cut the plane into complementary regions that are n -gons, including the outer region, where n is allowed to take some finite number of values? A curve is an (a_1, a_2, \dots, a_n) -curve if the number of edges for its complementary regions all lie in (a_1, a_2, \dots, a_n) . We show that there are infinitely many curves for $(2, n)$, where n is any odd integer greater than 3, and for $(3, n)$, for any $n > 3$ relatively prime to 3. We also consider the implications for knot theory, showing that every knot has a $(3, 4, 5)$ -diagram. We ask what values of (a_1, a_2, \dots, a_n) will generate diagrams for every knot.

Classification: H75

Keywords: closed curves; knots: $(2, n)$ -curves

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