Jump Return Problem on the Circle

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In this study, we consider a discrete dynamic system starting with n arbitrary points on a circle. In one transition, each point moves simultaneously from its current state counterclockwise to the ratio p:q division point of the arc in front of it. We are concerned with all possible numbers of transitions needed for at least one point returns to its initial position. As a consequence, depending on the ratio p/q, we give a formula for all of the number of transitions needed to satisfy the criterion. Also, we conclude that there always exists a sub-process in which the n points approach to a limiting steady state of n components having the amazing property to subdivide the circle evenly.

Awards Won:
American Mathematical Society: Third Award of $500