# Coexistence of three limit cycles for a septic polynomial differential systems

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**Abstract:** The existence of limit cycles is interesting and very important in applications. It is a key to understand the dynamic of polynomial differential systems. The aim of this paper is to investigate a class of planar differential systems of degree seven. Under some suitable conditions, the existence of three limit cycles two of them are non-algebraic while the third is algebraic is proved. Furthermore, these limit cycles are explicitly given in polar coordinates. Some examples are presented in order to illustrate the applicability of our results.

**Keywords:** planar polynomial differential system; first integral; periodic orbits; algebraic and non-algebraic limit cycle.

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