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Abstract: We derive a set of differential inequalities for positive definite functions based on previous results derived for positive definite kernels by purely algebraic methods. Our main results show that the global behavior of a smooth positive definite function is, to a large extent, determined solely by the sequence of even-order derivatives at the origin: if a single one of these vanishes then the function is constant; if they are all non-zero and satisfy a natural growth condition, the function is real-analytic and consequently extends holomorphically to a maximal horizontal strip of the complex plane.

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