1 Introduction

Let f and g be two non-constant meromorphic functions and a be a complex number. If $f-a$ and $g-a$ have the same zeros ignoring multiplicities, then we say that f and g share a IM. If $f-a$ and $g-a$ have the same zeros with the same multiplicities, then we say that f and g share a CM.

It is well-known that two non-constant meromorphic functions f and g share five distinct values IM must be identical, and f is a Möbius transformation of g if they share four distinct values. Therefore, it is natural to ask what happens if a meromorphic function shares values with its derivative? L.A. Rubel and C.C. Yang [10] proved that if a non-constant entire function f shares two distinct values CM with its derivative, then $f \equiv f'$, and G.G. Gundersen [5] proved that a non-constant meromorphic function f shares 0 and a non-zero complex number b CM with its derivatives, then $f \equiv f'$. We will study these results and give them the detail proofs.

In the next section, we review some basic definitions and results in the theory of value distribution. We study the uniqueness of an entire function f that shares two values (CM or IM) with their derivatives, especially, the result of L.A. Rubel and C.C. Yang [10] in section 3. In the last section, we study the uniqueness of a meromorphic function f that shares two values CM with their derivatives, especially, the result of G. G. Gundersen [5].