

## 7.4: Poisson's Theorem

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If  $f$  and  $g$  are two constants of the motion (i.e., they both have zero Poisson brackets with the Hamiltonian), then the Poisson bracket  $[f, g]$  is *also* a constant of the motion. Of course, it could be trivial, like  $[p, q] = 1$  or it could be a function of the original variables. But sometimes it's a new constant of motion. If  $f, g$  are time-independent, the proof follows immediately from Jacobi's identity. A proof for time *dependent* functions is given in Landau—it's not difficult.

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