[mex194] Determine canonicity and generating functions III

Consider the following transformation from a set of canonical coordinates (q, p) to a new set of coordinates (Q, P):

$$Q = \ln p, \qquad P = -qp.$$

(a) Verify that this transformation is canonical by investigating its Jacobian determinant. (b) Determine the generating function $F_1(q, Q)$ by integration of the total differential dF_1. (c) Determine the generating function $F_2(q, P)$ by integration of the total differential dF_2. (d) Determine the generating function $F_2(q, P)$ from $F_1(q, Q)$ via Legendre transform.

Solution: