Problem 1  (a) Find the Poisson bracket of \( f = p^2q + q^2 \) and \( g = pq \). (3 points)

(b) Suppose we wish to go from variables \( q, p \) to variables \( Q(q,p), P(q,p) \). We set

\[
Q = \frac{p}{1 - 3q}
\]  

(1)

Find a possible choice of \( P \). (7 points)