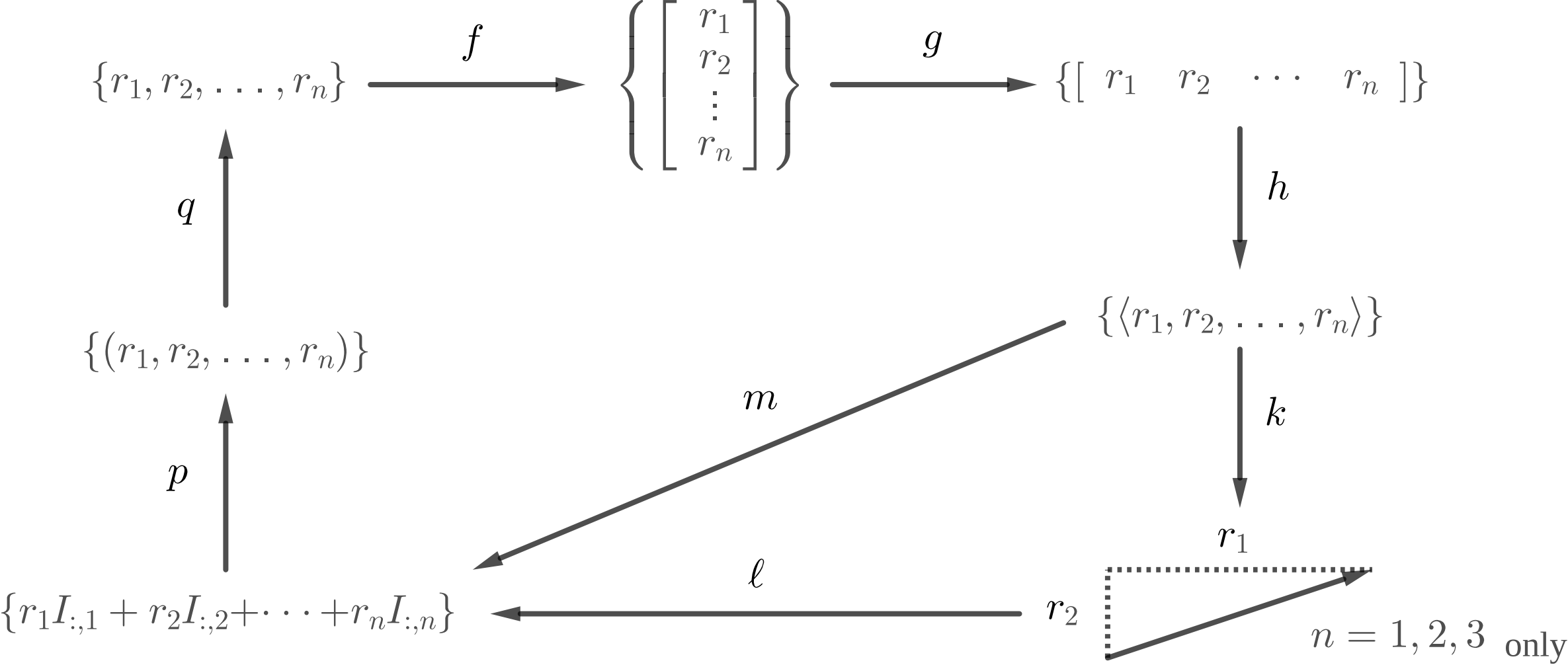

NOTE: $r_i \in \mathbb{R}, n = 1, 2, \ldots, n$