

# Mandatory Exercise: Level Ancestor

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**1 Path Sums** Let  $T$  be a rooted tree with  $n$  nodes. Each edge is assigned a *weight*. The weight of a path in  $T$  is the sum of weight of edges on the path. We are interested in a data structure that supports the following operation on  $T$ . Given leaves  $\ell_1$  and  $\ell_2$  and integers  $k_1$  and  $k_2$  define

- $\text{path-sum}(\ell_1, \ell_2, k_1, k_2)$ : return the weight of the path between the  $k_1$ -ancestor of  $\ell_1$  and the  $k_2$ -ancestor of  $\ell_2$ .

Give a compact data structure that supports fast queries.