

## CLRS 2-1

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a.

$$\Theta\left(\frac{n}{k} \cdot k^2\right) \in \Theta(nk)$$

b. Merge the lists pairwise, such that the recursion tree is of height  $\Theta(\lg \frac{n}{k})$ ; each level takes  $\Theta(n)$  for  $\Theta(n \lg(\frac{n}{k}))$  total.

c.  $k \in \Theta(\lg n)$ , since:

$$\Theta(nk + n \lg(\frac{n}{k})) \equiv \Theta(n \lg n + n \lg n - n \lg k) \quad (1)$$

$$\in \Theta(2n \lg n - n \lg \lg n) \quad (2)$$

$$\in \Theta(n \lg n) \quad (3)$$

d. Sort strings of increasing length until insertion sort surpasses merge sort; the cardinality of that list is  $k$ .