Sets 1

Storing a Set in a List

- We can implement a set with a list
- Elements are stored sorted according to some canonical ordering
- The space used is $O(n)$

Generic Merging (§10.2)

- Generalized merge of two sorted lists $A$ and $B$
- Template method genericMerge
- Auxiliary methods
  - aIsLess
  - bIsLess
  - bothEqual
- Runs in $O(n_A + n_B)$ time provided the auxiliary methods run in $O(1)$ time

Using Generic Merge for Set Operations

- Any of the set operations can be implemented using a generic merge
- For example:
  - For intersection: only copy elements that are duplicated in both list
  - For union: copy every element from both lists except for the duplicates
  - All methods run in linear time.

Set Operations

- We represent a set by the sorted sequence of its elements
- By specializing the auxiliary methods, the generic merge algorithm can be used to perform basic set operations:
  - union
  - intersection
  - subtraction
- The running time of an operation on sets $A$ and $B$ should be at most $O(n_A + n_B)$