QUEENS COLLEGE Department of Computer Science
CSCI 313 Practice problems on Applications and General Topics

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These are some of the solutions to practice problems. Not all problems have solutions here.

Solutions to some older problems might not make use of generics. Generics are now required in this course.

Problem 1 Each part of this problem gives some methods. You should answer by naming an ADT or data structure that supplies efficient implementations of the methods, specifying an appropriate implementation strategy, and writing a O-estimate for the run times of the given operations. For example, if the question read:

```
Methods: insert and remove using LIFO rules.
```

You could answer:

```
Stack. Linked node implementation. All operations have time O(1).
```

Note that standard method names such as push and pop have not been used in this problem. All O-estimates should be specified in terms of n, the number of items in the structure.

(i) Methods: insert and remove, where important items are removed first.

Answer: Priority Queue, array based Binary heap implementation, $O(log(n))$.

(ii) Methods: insert and remove, where items that have waited the longest are removed first.

Answer: Queue, linked implementation, $O(1)$.

(iii) Methods: insert, remove and find, where data items are Comparable.

Answer: Binary search tree, AVL implementation, $O(log(n))$.

(iv) Methods: insert, remove and find, where data items are not Comparable, but include a key. (In this case you do not need to specify an implementation or run times.)

Answer: Map, hash table implementation.