**Exercise 11.1**

1. **A dynamic set S is represented by a direct-address table T of length m. Describe a procedure that finds the maximum element of S. What is the worst-case performance of your procedure?**

**Ans)**

Worst case: Θ(m) where m is the length of the hash table T.

MAX(S,T):

max = -inf

for i = 0 to T.size:

if DIRECT-ADDRESS-SEARCH(T,i)!=NIL:

max = MAXIMUM(max, T[i]) j

return max

1. **A *bit vector* is simply an array of bits (0s and 1s). A bit vector of length m takes much less space than an array of m pointers. Describe how to use a bit vector to represent a dynamic set of distinct elements with no satellite data. Dictionary operations should run in O(1) time.**

**Ans)**

Let the hash table represent if the element exists or not using 0s and 1s. If index i exists, 1 else 0.

SEARCH: if searched index of this table is 1 then that element exists.

INSERT: Make the bit at k 1

DELETEL Make the bit at k 0

1. **Suggest how to implement a direct-address table in which the keys of stored elements do not need to be distinct, and the elements can have satellite data. All three dictionary operations (INSERT, DELETE, and SEARCH) should run in O(1) time. (Don't forget that DELETE takes as an argument a pointer to an object to be deleted, not a key.)**

**Ans)**

Let the element be a linked list.