CS590 homework 5 – Hash tables

The due date for this assignment is Friday, Nov 9th, at 11.59pm. This assignment is worth 10% of your final grade.

Any sign of collaboration will result in a 0 and being reported to the Graduate Academic Integrity Board. Late submission policy described in the syllabus will be applied.

(100 points)

1. We wish to implement a dictionary by using direct addressing on a huge array. At the start, the array entries may contain garbage, and initializing the entire array is impractical because of its size. Describe a scheme for implementing a direct-address dictionary on a huge array. Each stored object should use O(1) space; the operations SEARCH, INSERT, and DELETE should take O(1) time each; and the initialization of the data structure should take O(1) time. (Hint: Use an additional stack, whose size is the number of keys actually stored in the dictionary, to help determine whether a given entry in the huge array is valid or not.) **(70 pts)**

The description should be detailed enough, so if a programmer reads the description, they should be able to write the code with no further questions.

2. Consider a hash table of size m = 1000 and a corresponding hash function:

$h(k) = \lfloor m(kA \bmod 1) \rfloor$, $A = \frac{\sqrt{5}-1}{2}$

Compute the locations to which the keys 61, 62, 63, 64, and 65 are mapped. **(30 pts)**