CSCI 305, Homework # 7

YOUR NAME HERE

Due date: Midnight, Tuesday, May 29

Quadratic probing. This is problem 11-3 in the book.

Suppose that we are given a key k to search for in a hash table with positions $0, 1, ..., m-1$, and suppose that we have a hash function h mapping the key space into the set $\{0, 1, ..., m-1\}$. The search scheme is as follows:

1. Compute the value $j = h(k)$ and set $i = 0$.
2. Probe in position j for the desired key k. If you find it, or if this position is empty, terminate the search.
3. Set $i = i+1$. If i now equals m, the table is full, so terminate the search. Otherwise, set $j = (i+j)$ mod m and return to step 2.

Assume that m is a power of 2.

a. Show that this scheme is an instance of the general "quadratic probing" scheme by exhibiting the appropriate constants c_1 and c_2 for equation (11.5).

b. Prove that this algorithm examines every table position in the worst case.