Hash Tables

1. In searching for a good hash function over the set of integer values, one student thought he could use the following:

*int index = (int) cos(value); // Cosine of 'value'*

What was wrong with this choice?

Cosine can only return values between 0 and 1, which creates a problem. The problem is that it has been typecasted as an int and an int can only return either a 0 or 1 from the cosine. If this expression were to be used only the buckets at the 0th and 1st position would be filled.

1. Can you come up with a perfect hash function for the names of days of the week? The names of the months of the year? Assume a table size of 10 for days of the week and 15 for names of the months. In case you cannot find any perfect hash functions, we will accept solutions that produce a small number of collisions (< 3).
2. The function containsKey() can be used to see if a dictionary contains a given key. How could you determine if a dictionary contains a given value? What is the complexity of your procedure?