

## CS 161: Recitation 4 (Fall 2016)

Most of this recitation will focus on review of red-black trees and universal hashing.

### Question 1

Consider a hash table with  $n$  buckets and  $n$  elements. We assume that each element has a distinct key and the simple uniform hashing property: each element has equal probability of hashing into any of the  $n$  buckets independently of other elements.

- (a) For a particular bucket, what is the probability that the bucket has exactly one element? How about  $k$  elements?
- (b) Let  $X_i$  be a random variable for the number of elements in bucket  $i$ . What is the expected value of  $X_i$ ?