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Assignment 5.1  
CS215  
Data Structures

1.

a. *Explain how a hash function is used.*A hash function takes a search key and returns a hash, an integer that can be used as the index into the collection to find the associated data in a simpler way than to search by iterating an array.

b. *How might a string hash function be written?*A string hash function would take a string as the key, then converting the characters to Unicode integers, multiplying them by the integer value of their position in the string, and summing the value for a total. Afterwards, you would mod the total by the length of the collection to get the hash for a given string.

c. *Explain why we might choose to use a hash function rather than search for a key.*Searching for a string would require iterating an array. Using a hash function to store data in a collection makes it much easier to call on that data later at a much more efficient rate.

d. *What hash function does the Java Util HashMap use for hashmap strings?*

Java uses the hash function:  
   
‘u’ represents the ‘u’th character in a string; for example, in the string ‘Familial’ the character ‘m’ would have u = 3. ‘g’ is simply the constant 31. In every use of the Java Util HashMap, g is equal to 31. ‘n’ is the length of the string, in our example ‘Familial’, n = 8.  
The function takes the position of each character and multiplies it by 31 n-1 times and sums it all up in the end to get the hash that will be used in the modular arithmetic to get the index.