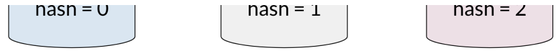
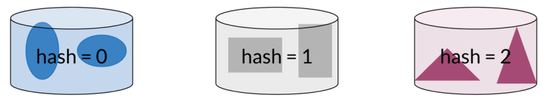
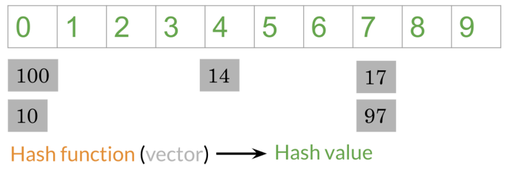


Note that the figures blue, red, and gray ones would each be clustered with each other



You can think of hash function as a function that takes data of arbitrary sizes and maps it to a fixed value.
The values returned are known as *hash values* or even *hashes*.



The diagram above shows a concrete example of a hash function which takes a vector and returns a value. Then you can mod that value by the number of buckets and put that number in its corresponding bucket. For example, 14 is in the 4th bucket, 17 & 97 are in the 7th bucket. Let's take a look at how you can do it using some code.

```
def basic_hash_table(value_l,n_buckets):

    def hash_function(value_l,n_buckets):
        return int(value_l) % n_buckets

    hash_table = {i:[] for i in range(n_buckets)}
    for value in value_l:
        hash_value = hash_function(value,n_buckets)
        hash_table[hash_value].append(value)
    return hash_table
```

The code snippet above creates a basic hash table which consists of hashed values inside their buckets. **hash_function** takes in *value_l* (a list of values to be hashed) and *n_buckets* and mods the value by the buckets. Now to create the *hash_table,* you first initialize a list to be of dimension *n_buckets (*each value will go to a bucket). For each value in your list of values, you will feed it into your **hash_function,** get the *hash_value,* and append it to the list of values in the corresponding bucket.

Now given an input, you don't have to compare it to all the other examples, you can just compare it to all the values in the same *hash_bucket* that input has been hashed to.

When hashing you sometimes want similar words or similar numbers to be hashed to the same bucket. To do this, you will use “locality sensitive hashing.” Locality is another word for “location”. So locality sensitive hashing is a hashing method that cares very deeply about assigning items based on where they’re located in vector space.