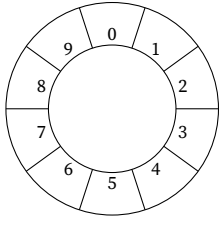
Separate chaining

(a) We start with an empty array of size $N = 10$.



The hash function you shall use is $h(k, N) = k \mod N$, which for this example becomes $h(k, 10) = k \mod 10$. That is, a number hashes to its last digit.

Use *separate chaining* to insert these key- and value pairs in the given order:

$$(21, a), (54, b), (82, c), (10, d), (20, e), (44, f), (10, g)$$

Write down the result after the last insertion, with each line in the form:

$$i\colon (k_1, v_1), (k_2, v_2), \ldots$$

where i is an index in the array, and $(k_1, v_1), (k_2, v_2), \ldots$ are key- and value pairs.

(b) Briefly explain how the algorithm for insertion with separate chaining works, and outline the algorithm with pseudocode. You may assume that you have a hash function h such that $h(k, N)$ yields a number between 0 and $N - 1$ for an arbitrary key k. You do not need to account for rehashing.

Input: An array A of size N, a key k and value v
Output: An array where (k, v) is inserted with separate chaining

```
1 Procedure SeparateChainingInsert(A, k, v)
  |   // ...
```

(c) Briefly account for the runtime complexity of insertion with separate chaining.