Alexander Shah
Homework 10: Hashing
EN.605.202.81 Section 84
December 11, 2023

```
// hash function
def get_hashed_value(key) -> int:
    return key * 2 + 3

if collision:
    get_hashed_value(current_index)

// size 10
arr = [5, 4, 25, 8, 10, 34, 18, 51, 17, 21]

// size 13
hash = [0,0,0,0,0,0,0,0,0,0,0,0,0]
```

1. Linear probing

arr[0]
get_hashed_value(5) = 13%13
= 0

arr[1]
get_hashed_value(4) = 11%13
= 11

arr[2]
get_hashed_value(25) = 53%13
= 1

arr[3]
get_hashed_value(8) = 19%13
= 6

arr[4]
get_hashed_value(10) = 23%13
= 10

arr[5]
get_hashed_value(34) = 71%13
= 6; collision at 6! moved to 7

arr[6]
get_hashed_value(18) = 39%13
= 0; collision at 0! collision at 1! moved to 2

arr[7]

get_hashed_value(51) = 105%13
= 1; collision at 1! collision at 2! moved to 3

arr[8]
get_hashed_value(17) = 37%13
= 11; collision at 11! moved to 12

arr[9]
get_hashed_value(21) = 45%13
= 6; collision at 6! collision at 7! moved to 8

```
           00  01  02  03  04  05  06  07  08  09  10  11  12
hash = [05, 25, 18, 51, 00, 00, 08, 34, 21, 00, 10, 04, 17]
```

collision at 6!
collision at 0! collision at 1!
collision at 1! collision at 2!
collision at 11!
collision at 6! collision at 7!

In total there are 5 direct collisions, 8 total when counting moving during linear probing.

2. Re-hashing

arr[0]
get_hashed_value(5) = 13%13
= 0

arr[1]
get_hashed_value(4) = 11%13
= 11

arr[2]
get_hashed_value(25) = 53%13
= 1

arr[3]
get_hashed_value(8) = 19%13
= 6

arr[4]
get_hashed_value(10) = 23%13
= 10

arr[5]
get_hashed_value(34) = 71%13
= 6; collision at 6! get_hashed_value(6) = 15%13
= 2

arr[6]
get_hashed_value(18) = 39%13
= 0; collision at 0! get_hashed_value(0) = 3%13
= 3

arr[7]
get_hashed_value(51) = 105%13
= 1; collision at 1! get_hashed_value(1) = 5%13
= 5

arr[8]
get_hashed_value(17) = 37%13
= 11; collision at 11! get_hashed_value(11) = 25%13
= 12

arr[9]
get_hashed_value(21) = 45%13
= 6; collision at 6! get_hashed_value(6) = 15%13
= 2; collision at 2! get_hashed_value(2) = 7%13
= 7

```
          00  01  02  03  04  05  06  07  08  09  10  11  12
hash = [05, 25, 34, 18, 00, 51, 08, 21, 00, 00, 10, 04, 17]
```

collision at 6! resolved to 2
collision at 0! resolved to 3
collision at 1! resolved to 5
collision at 11! resolved to 12
collision at 6! collision at 2! resolved to 7

In total there were 5 direct collisions and 6 total during re-hashing.