# Homework 3
## Due date: 4/2/2024

- 10.1-1
- 10.1-3
- 10.1-7
- 10.2-1
- 10.2-4
- 10.2-6
- 10.3-1
- 10-1

- 11.1-1
- 11.1-2
- 11.2-1
- 11.2-6
- 11.3-1
- 11.3-2
- 11.4-1
- 11.4-5

- 12.1-2
- 12.1-3
- 12.1-5
- 12.2-1
- 12.2-5
- 12.2-6
- 12.3-4
- 12.3-5
- 12-1

Programs:

1. Implement the selection algorithm given in Section 9.3 using C, C++ or Python.

2. Using C, C++ or Python to implement a double hash function with two prime numbers $m$ and $m'$ $(m > m')$ such that

$$h(k, i) = (h_1(k) + i h_2(k)) \bmod m$$

where $h_1(k) = k \bmod m$
$$h_2(k) = 1 + k \bmod m'$$

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1. **For program 1, use the similar submission style you were requested for Homework #2.**
2. **For program 2, the input and output file formats are shown below. You should test your program using a file with 5000 random numbers and discuss the average # collisions of your hash functions in your report.**

| Input file | Output file |
|---|---|
| Line 1: m, m', #of integers to be hashed<br>Line 2: Num1<br>Line 3: Num2<br><br>     .<br>     .<br>     .<br>Line k: Numk (Last number) | Line 1: m, m', #of integers hashed<br>Line 2: hash value of Num1, #collisions for Num1<br>Line 3: hash value of Num2, #collisions for Num2<br><br>   .<br>      .<br>      .<br>Line k: hash value of Numk, #collisions for Numk<br>Total # collisions occurred, Ave. # collisions occurred |

# Notes on Homework

- Please put your handwriting homework in a file similar to HW#1 and #2 and send it to TA by 4/2.

- Please write down the homework number, your name and your student ID on the first page of the file.

- You would get only 80% of the graded score for each day of delay, i.e., 80% for one day delay, 64% two days, 51.2% three days and so on.

# **File Organization**

- The input file and output file names must be "input.txt" and "output.txt". You don't need to hand in them.

- Please follow the file hierarchy and the naming rules specified below.

E240XXXXX_hw3_v1.tar (.zip)

E240XXXXX_hw3_v1

E240XXXXX_hw3_hand.pdf

E240XXXXX_hw3_prog.pdf

Program Files with discussions
(selection algorithm/hash function)