IS-211 Mandatory Assignment 2

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To be solved in groups. Code in Java.

Deadline: 31. Mars

First a couple of brief and light theory questions to get you started ☺

# Theory tasks

1. What are the two essential operations of a Stack? Mention two other useful but nonessential operations
2. What data structures are commonly used in a database index? Why?
3. What are the most important features and advantages of the hashmap data structure?

# Search tasks

Given this array of numerical elements:

{4, 2, 7, 6, -3, -1, -2, 42, 0, -42, 9, -4, 5, -5, -6, -7, -8, -99, 42, 11, 20, 1, 2, 3}

For each task, chose a suitable data structure for searching the given array and argue for your choice, and submit the Java-code from solving the task, and the output from running it.

Write a programme that finds and prints:

1. All consecutive sub-arrays in the given array that adds up to zero.
2. All pairs of elements (anywhere in the array) that adds up to zero.
3. The locations in the array of the smallest and largest number in the array (starting on 1, not 0, so conversion may be necessary if the indexing is zero-based)

# Stack and Queue

Write a simple Java-programme where the data structure can function both as a stack and as a queue. That is, you can push element to one end, but pop elements from both ends.

Deliver the code and output of pushing numbers 1 to 20. Then the output of calling the following methods: stackpop, queuepop, stackpop, stackpop, queuepop.

# Priority queue

Write a small Java-programme for handling priority and outputting elements in prioritized order.

Element has the following attributes: string name, int priority

Implement the following functions:

Boolean add\_element(Element e)

Element get\_highest\_priority\_element()

Boolean print\_all\_elements\_in\_order()

Add the elements of the table to the system, and submit the code, output of running all functions, and a short explanation of your design choices. Higher number is higher priority.

|  |  |
| --- | --- |
| Terje | 5 |
| Kari | 7 |
| Nils | 4 |
| Otto | 8 |
| Syvert | 7 |
| Lise | 11 |
| Notto | 0 |
| Odd | 1 |
| Even | 2 |