Workshop 13: Solving Sample Exam Questions

The purpose of this workshop is to practice answering some exam questions. We will use Sample Exam 1, that the students already have. Make sure to cover questions 6, 8, and 12. If time permits, cover question 10.

Sample Questions: Give this document to the students (I suggest in Word form, so that they’ll be able to write their answers in the document). Tell them that this is how the exam will look like: they have to write the answers in the given pages.

Help pages: Guide the students to print the Help pages of Final Exam Sample 1 (page 8 – 11), or have them handy all the time. Explain that in the exam, they have to spend 10-15 minutes reading these pages. Explain that *there is nothing new here*, except that the List class is named LinkedList in the exam.

For each one of questions 6, 8, 12, and 10 (in this order):

1. Give the students 5 minutes to read and think about the question.  
If they want, they can start drafting a solution (טיוטה).

2. Discuss the solution’s general strategy.

3. Give the students another 5 minutes to write the solution, in pseudo code. This is a workshop, not the real exam. We don’t have time to write a complete answer.

4. Present and discuss the solution. Emphasize that in the exam they don’t have to use exact Java syntax.

Question 6

* General solution strategy: Iterating through the list, until we find the right node.
* Explain the need to maintain two pointers, in order to enable inserting the new node before the current one. Point out that this is similar to the remove method logic (they saw/implemented this method before).

Question 8

* General solution strategy: If you add digits to a list which is ordered in decreasing order, you will end up sorting the digits from large to small. That’s exactly what we want. Once you have such a list, you can use it for creating the required number.
* Explain that the students need to know how to extract digits from a number, using repetitive modulo and integer division. They did it in one of their homeworks.
* Explain that the students can use any List method that they want from the List class API.

Question 12

* General solution strategy: To decide a number by 2, we can count how many times we can subtract 2 from the number until the remainder is 0 or 1.
* Explain how to stage a loop that carries out this operation.

Question 10

* General solution strategy: We have to compare every element of one array to all the elements of the other array.
* Start by writing a non-recursive solution, using a nested FOR loop with two indexes i and j.
* Next, discuss how thus nested loop logic can be converted to a recursive function.
* Identify the recursion bases cases, and the recursive/reductive step: if (arr1[i] == arr2[j]), we can now call the function on the remainder of the two arrays.