

American University of Armenia, CSE CS  
121 Data Structures, Spring 2022

Midterm Exam 2

Instructions:

- **Add implementations for the tasks below in the corresponding empty placeholder functions provided in the project. DO NOT change the function semantics.**
  - **Make sure to add implementation of any (helper) function you might need or use in your code.**
  - **Submission should be in the form of an IntelliJ project. No other submission would be accepted. Just export the project into a zip file and submit the zip file.**
1. Implement a *boolean areSetsEqual(SetADT<T> s1, SetADT<T> s2)* function which returns true if two given sets are equal, meaning they have the same number of elements each and all elements from one set are present in another set as well. **No need to implement helper functions for this one.** (10 points)
  2. Implement *int getNumberOfEmployeesBornAfter(int year)* function for EmployeesHashSet class which returns the number of Employees in the set who were born after the given year. (20 points)
  3. Implement an index iterator for the EmployeesHashMap class which starts the iteration from element at a given position. **Do not use any other collection, including arrays.** (20 points)
  4. Implement *boolean removeElementAtIndex(int index)* function for EmployeesTreeSet class which removes element at given position in set following inorder traversal. (20 points)
  5. Implement *boolean isGroupTechniac1()* function for EmployeesTreeSet class which returns true if the the difference between technical (SW engineer, QA engineer) and non technical (Accountant, Sales person) members of the set is larger than 60%. **The implementation should be done without using an iterator. Helper functions can be used if needed.** (20 points)
  6. Implement *oddPositionIterator* for EmployeesTreeap class which iterates over the keys of the tree map starting from the Entry at position 1 (the numbering starts from 0) and going over Entries at 3, 5, ... positions and returning their keys. **Do not use any other collection, including arrays.** (10 points)