

Analysis of Algorithms
CS 375, Spring 2020
Project 1—REVISED
Due **BY 11:59PM** Anywhere on Earth, Sunday, April 12

Project 1: Determining Algorithmic Time Complexity

In this assignment, you'll work in teams (picked randomly by your Prof.—see the course website) to determine the asymptotic time complexities of methods in a class. You will be given source code for the class, and you will figure out asymptotic complexities by analyzing that code.

The goals of this project are:

- to give you practice determining the worst-case time complexity of an algorithm given its source code; and
- to give you practice working with other students in a team.

Exercises

Download the source code for the `ArrayIntegerSet` class from the course Projects and Presentations website.

For each constructor and method in the `ArrayIntegerSet` class, determine its worst-case time complexity (using Θ notation) in terms of the number of elements n in the set and, if appropriate, any other data, such as the size m of any parameters. You do not need to analyze the `main()` itself method, but for every other method, please add something like the following in its comment header:

```
// Time complexity:  $\Theta(n)$ , where  $n$  is the size of this ArrayIntegerSet
```

For every method analyzed, be sure to unambiguously state what each variable in your time complexity expression refers to. For example, if two relevant variables refer to arrays, be very clear which variable refers to which array. (For example, please be more specific than saying “the input array,” as from some perspective, any relevant parameter could be viewed as input!)

You need not explain how you came up with your complexity formula; in particular, you do not need to say what you used as the primitive operation (*barometer operation*) that you counted. Be sure to give the complexity of all methods (other than `main()`), whether public or private.

What to Submit

Each group should submit just one set of answers. In particular, each team should submit a text file that includes only the source code that you analyzed and the time complexity of all the methods. The time complexity should be included in the comment header for each function.

To indicate the team submitting that file, please be sure to name your file

`team_<LETTER>_ArrayIntegerSet.txt`

where <LETTER> is replaced by the letter corresponding to the group in the team assignments. E.g., the file from *team a* would be called `team_a_ArrayIntegerSet.txt`.

(Note the change from the previously posted instructions!) Please be sure to give your file a `.txt` extension, not a `.java` extension.

Submission instructions: For this project, each group should have one “designated submitter” to handle submission of their materials. The designated submitter should **email me** (eaaron@colby.edu) the file.