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Time Complexity

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| --- | --- | --- | --- | --- | --- | --- |
|  | ResizableArrayBag | | | LinkedBag | | |
| union | intersection | difference | union | intersection | difference |
| Time complexity in the Best Case | O(1) | O(1) | O(1) | O(1) | O(1) | O(1) |
| Time complexity in the Worst Case | O(N) | O(N^2) | O(N^2) | O(N) | O(N) | O(N) |

ResizableArrayBag Time Complexity

**Union**:

-Worst Case Scenario: In this given instance, the line of code :

for (T elem : mine)

dominates the previous time complexities of 1. In the code above, the for loop can be considered O(n) because it searches through the array n amount of times.

-Best Case Scenario: The best case scenario would be O(1) if the bag were to be empty, it would only loop once because there would be no elements in the array mine.

**Intersection**:

-Worst Case Scenario: In this given instance, the line of code :

for (int i=0; i<mine.length;i++)

dominates the previous time complexities of 1 and n. In the code above, int i=0 is n, i<mine.length is n, and the i++ is 1. So together that makes n\*n\*1 which can be simplified to n^2.

-Best Case Scenario: The best case scenario would be O(1) because if the array is empty, it would stop due to i<mine.length.

**Difference**:

-Worst Case Scenario: In this given instance, the line of code :

for (int i=0; i<mine.length;i++)

dominates the previous time complexities of 1 and n. In the code above, int i=0 is n, i<mine.length is n, and the i++ is 1. So together that makes n\*n\*1 which can be simplified to n^2.

-Best Case Scenario: The best case scenario would be O(1) because if the array is empty, it would stop due to i<mine.length..

LinkedBag Time Complexity

**Union**:

-Worst Case Scenario: In this given instance, the line of code :

for (T elem : mine)

dominates the previous time complexities of 1. In the code above, the for loop can be considered O(n) because it searches through the array n amount of times.

-Best Case Scenario: The best case scenario would be O(1) if the bag were to be empty, it would only loop once because there would be no elements in the array mine.

**Intersection**:

-Worst Case Scenario: In this given instance, the line of code :

for (T elem : others)

dominates the previous time complexities of 1. In the code above, the for loop can be considered O(n) because it searches through the array n amount of times.

-Best Case Scenario: The best case scenario would be O(1) if the bag were to be empty, it would only loop once because there would be no elements in the array others.

**Difference**:

-Worst Case Scenario: In this given instance, the line of code :

for (T elem : others)

dominates the previous time complexities of 1. In the code above, the for loop can be considered O(n) because it searches through the array n amount of times.

-Best Case Scenario: The best case scenario would be O(1) if the bag were to be empty, it would only loop once because there would be no elements in the array others.