COMP3506 – Homework 2

sortQueue(Queue<T> queue**):**

Since the parameters for the algorithm is to maintain a space complexity of O(1), using bubble sort is the most appropriate algorithm. In regard to memory complexity, the worst-case running time for bubble sort can be represented as:

$$\frac{n(n-1)}{2}$$

Using the master theorem, this can be simplified to $O(n^2)$ which is the big O notation for bubble sort. The asymptotic complexity for bubble sort is $\theta(n^2)$.

Memory Complexity findMissingNumber(int[] numbers**):**

The worst case running time for findMissingNumber() is when the missing number is the second last element of the Array. This is because the algorithm starts at index 0 and compares the following element, so it will have to parse $n-1$ elements before it finds the missing number. The memory complexity can be defined as $O(n)$, this is because the function will run recursively once for each element in the Array, which is n times.