

Problem 1:

The runtime of my code is given by, $O(n * \log(\text{maxNum}) \text{ (log base 10)})$. Where maxNum is the max number of the array. Where n is the array size and since we are using the decimal system we use log base 10.

The bottleneck of my code occurs here, because I'm recursively calling the internal sort method, for incrementing powers of 10. Since the internal sort method has a runtime of $O(4n) = O(n)$ then the total runtime must be $O(n * \log(\text{maxNum}) \text{ (log base 10)})$. My code is stable because no matter the parameters it will always run, it will never fail. My code already uses constant extra space, because i recursively called internal sort to avoid storing variables to the main frame.

```
for (int power = 1; maxNum/power > 0; power *= 10){  
    InternalSort(arr, arraySize, power);  
}
```