Quiz 3

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- **Question 1**

  1. quick
  2. heap
  3. merge

- **Question 2**

  Both algorithms' approach to choosing a pivot depends on the implementation so I'll only focus on the partition step.

  1. Lomuto
     - One pointer to keep track of the value higher than the pivot seen from the left
     - One pointer iterating through the array from the left
     - Swaps the values at the pointers when the value at the iterating index is in the wrong side of the pivot
     - Doesn't guarantee the values are in the correct place.
     - Performs more swaps
  2. Hoare
     - One pointer iterating through the array from the right
     - One pointer iterating through the array from the left
     - Only swaps when BOTH values at the pointers are in the wrong side of the pivot
     - Guarantees the values are in the correct place.
     - Performs less swaps

  I think that Hoare partition is faster because it performs less swaps

- **Question 3**

```
function checkElementLargerThanIndex(array, left, right):
    if left > right:
        return False

    mid = ( left + right ) // 2

    // No need to check left side
    if array[mid] > mid:
        return True
    else:
        return checkElementLargerThanIndex(array, mid + 1, right)

isValid = not checkElementLargerThanIndex(array, 0, array.length - 1)
```