

Algorithm

Algorithm

마방진 (Magic Square)

- 홀수만 처리 가능!

```
int size = 5;

int[][] arr = new int[size][size];
int middle = size/2;

int i=0, j=middle;
for(int num=1 ; num<=size*size ; num++) {
    arr[i][j] = num;
    //행 감소
    i--;
    if(i < 0)
        i = size-1;
    //열 증가
    j = (++j)%size;
    //아래 표현과 같다.
    /*j++;
    if(j >= size)
        j = 0;*/

    //배수이면 행은 1 증가, 열은 그대로
    if(num%size == 0) {
        i = (i+2)%size;
        j--;
        if(j < 0)
            j = size-1;
    }
}
```

Sort

합병 정렬 (Merge Sort)

참조

Radix Sort (기수 정렬)

참조

Search

이진 탐색 (Binary Search)

- 일반적인 구현

```
public static int binarySearch(int[] arr, int target) {
    int left = 0;
    int right = arr.length - 1;
    int mid = 0;
    while(left <= right) {
        mid = (left + right) / 2;
        if(arr[mid] < target)
            left = mid + 1;
        else if (arr[mid] > target)
            right = mid - 1;
        else
            return mid;
    }
    return Integer.MIN_VALUE;
}
```

- 재귀적 구현

```
public static int binarySearchRecursive(int[] arr, int target, int left,
int right) {
    if(left > right)
        return Integer.MIN_VALUE;
    int mid = (left + right) / 2;
    if(arr[mid] < target)
        return binarySearchRecursive(arr, target, left + 1, right);
    else if (arr[mid] > target)
        return binarySearchRecursive(arr, target, left, right - 1);
    else
        return mid;
}
```

- $A \leq B$ 조건을 검색. (반환값이 index+1 이므로)

```
public static int binarySearch(ArrayList<Integer> list, int target) {

    int left = 0;
    int right = list.size() - 1;
    int middle = 0;
```

```
while(left <= right) {
    middle = (left + right) / 2;
    if(target < list.get(middle)) {
        right = middle - 1;
    }
    else {
        left = middle + 1;
    }

    if(list.get(middle) <= target && middle < list.size() - 1) {
        if(target < list.get(middle + 1)) {
            return list.get(list.size() > middle + 1 ? middle + 1 :
list.size() - 1);
        }
    }
}
return -1;
}
```

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