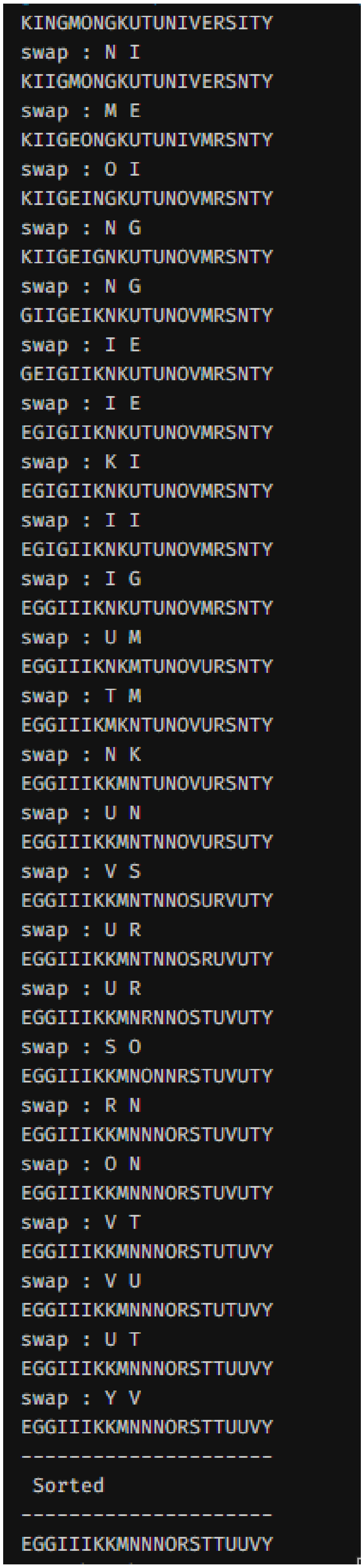
Hw sorting

1. จงเรียงลำดับข้อมูลต่อไปนี้ จากน้อยไปมาก ด้วยวิธีการ Quick Sort algorithm

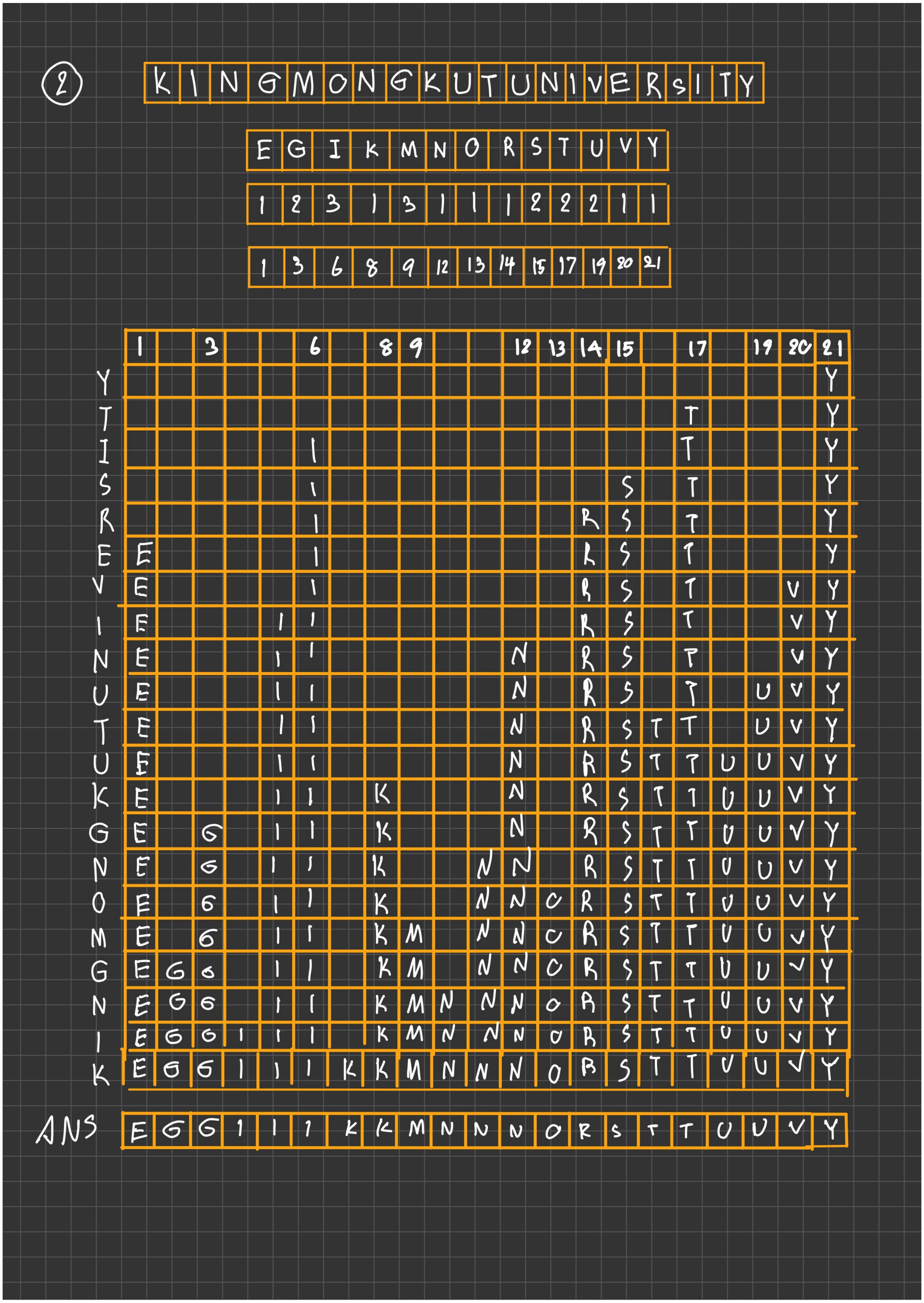
```
#include <stdio.h>
#include <string.h>

void swap(char *a, char *b) {
    int temp;
    temp = *a;
    *a = *b;
    *b = temp;
}

int partition(char str[], int l, int r) {
    int p = str[l];
    int j = r;
    int i = l;

    while (1) {   // repeat
        i = i + 1;
        while(str[i] <= p && i <= j  ) {        // repeat untill A[i] >= p
            i++;
        }
        while (str[j] >= p && j >= i) {         // repeat untill A[j] <= p
            j--;
        }
        if (j < i) {       // repeat untill i >= j
            break;
        } else {
            printf("swap : %c %c\n", str[i], str[j]);
            swap(&str[i], &str[j]);  //swap(A[i], A[j])
            printf("%s\n", str);
        }
    }
    printf("swap : %c %c\n", str[i], str[j]);
    swap(&str[l], &str[j]);  //swap(A[l], A[j])
    printf("%s\n", str);
    return j;
}

void qiuckSort(char str[], int l, int r) {
    int s;
    if (l < r) {
        s = partition(str, l, r);
        qiuckSort(str, l, s - 1);
        qiuckSort(str, s+1, r);
    }
}

int main() {
    char str[64] = "KINGMONGKUTUNIVERSITY";
    int size = strlen(str);
    printf("%s\n", str);
    qiuckSort(str, 0, size - 1);        // send array to sort;
    printf("---------------------\n Sorted \n---------------------\n");
    printf("%s", str);                  // output

    return 0;
}
```

Output



```
KINGMONGKUTUNIVERSITY
swap : N I
KIIGMONGKUTUNIVERSNTY
swap : M E
KIIGEONGKUTUNIVMRSNTY
swap : O I
KIIGEINGKUTUNOVMRSNTY
swap : N G
KIIGEIGNKUTUNOVMRSNTY
swap : N G
GIIGEIKNKUTUNOVMRSNTY
swap : I E
GEIGIIKNKUTUNOVMRSNTY
swap : I E
EGIGIIKNKUTUNOVMRSNTY
swap : K I
EGIGIIKNKUTUNOVMRSNTY
swap : I I
EGIGIIKNKUTUNOVMRSNTY
swap : I G
EGGIIIKNKUTUNOVMRSNTY
swap : U M
EGGIIIKNKMTUNOVURSNTY
swap : T M
EGGIIIKMKNTUNOVURSNTY
swap : N K
EGGIIIKKMNTUNOVURSNTY
swap : U N
EGGIIIKKMNTNNOVURSUTY
swap : V S
EGGIIIKKMNTNNOSURVUTY
swap : U R
EGGIIIKKMNTNNOSRUVUTY
swap : U R
EGGIIIKKMNRNNOSTUVUTY
swap : S O
EGGIIIKKMNONNRSTUVUTY
swap : R N
EGGIIIKKMNNNORSTUVUTY
swap : O N
EGGIIIKKMNNNORSTUVUTY
swap : V T
EGGIIIKKMNNNORSTUTUVY
swap : V U
EGGIIIKKMNNNORSTUTUVY
swap : U T
EGGIIIKKMNNNORSTTUUVY
swap : Y V
EGGIIIKKMNNNORSTTUUVY
---------------------
 Sorted
---------------------
EGGIIIKKMNNNORSTTUUVY
```

2. จงเรียงลำดับข้อมูลก่อนหน้านี้ จากน้อยไปมาก ด้วยวิธีการ Distribution Counting Sort algorithm



2

K	I	N	G	M	O	N	G	K	U	T	U	N	I	V	E	R	s	I	T	Y

E	G	I	k	M	N	O	R	S	T	U	V	Y
1	2	3	1	3	1	1	1	2	2	2	1	1

1	3	6	8	9	12	13	14	15	17	19	20	21

	1		3			6		8	9			12	13	14	15		17		19	20	21
Y																					Y
T																	T				Y
I						I											T				Y
S						I									S		T				Y
R						I								R	S		T				Y
E	E					I								R	S		T				Y
V	E					I								R	S		T			V	Y
I	E				I	I								R	S		T			V	Y
N	E				I	I						N		R	S		T			V	Y
U	E				I	I						N		R	S		T		U	V	Y
T	E				I	I						N		R	S	T	T		U	V	Y
U	E				I	I						N		R	S	T	T	U	U	V	Y
K	E				I	I		K				N		R	S	T	T	U	U	V	Y
G	E		G		I	I		K				N		R	S	T	T	U	U	V	Y
N	E		G		I	I		K			N	N		R	S	T	T	U	U	V	Y
O	E		G		I	I		K			N	N	O	R	S	T	T	U	U	V	Y
M	E		G		I	I		K	M		N	N	O	R	S	T	T	U	U	V	Y
G	E	G	G		I	I		K	M		N	N	O	R	S	T	T	U	U	V	Y
N	E	G	G		I	I		K	M	N	N	N	O	R	S	T	T	U	U	V	Y
I	E	G	G	I	I	I		K	M	N	N	N	O	R	S	T	T	U	U	V	Y
K	E	G	G	I	I	I	K	K	M	N	N	N	O	R	S	T	T	U	U	V	Y

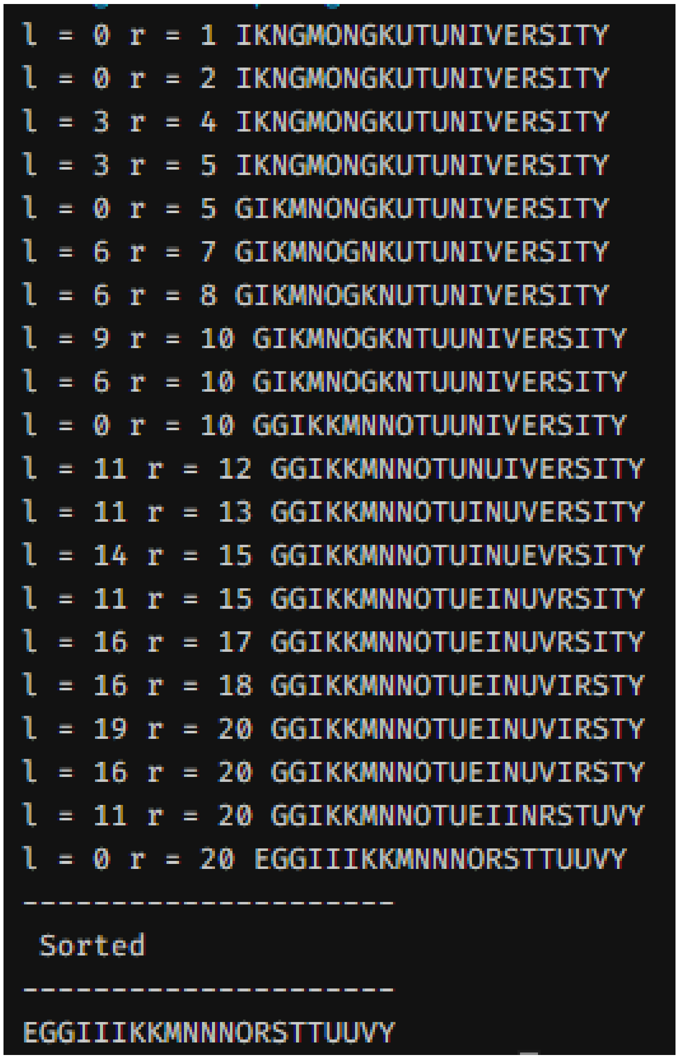
ANS	E	G	G	I	I	I	K	K	M	N	N	N	O	R	S	T	T	U	U	V	Y

3. จง Implement Merge Sort algorithm ด้วยภาษาซี

```c
#include <stdio.h>
#include <string.h>
#include <math.h>

void copyStr(char arr[], int indexArr, int endArr, char str[], int indexStr, int endStr) {
    while (indexArr <= endArr) {
        str[indexStr] = arr[indexArr];
        indexArr++;
        indexStr++;
    }
}

void merge(char arr[], int l, int m, int r) {
    int n1 = m - l + 1;
    int n2 = r - m;
    int i = 0;
    int j = 0;
    int k = 0;
    char str[64];

    while (i < n1 && j < n2) {
        if (arr[l + i] < arr[m + 1 + j]) {
            str[k] = arr[l + i];
            i = i + 1;
        } else {
            str[k] = arr[m + 1 + j];
            j = j + 1;
        }
        k = k + 1;
    }
    if (i == n1) {
        copyStr(arr, m + 1 + j, r, str, k, n1+n2-1);
    } else {
        copyStr(arr, l + i, m, str, k, n1+n2-1);
    }
    copyStr(str, 0, n1 + n2 - 1, arr, l, r);
}

void mergeSort(char str[], int l, int r) {

   if (r > l) {
        int m = (l + r) / 2;
        mergeSort(str, l, m);
        mergeSort(str, m+1, r);
        merge(str, l, m, r);
        printf("l = %d r = %d %s\n", l, r, str);
   }

}
```

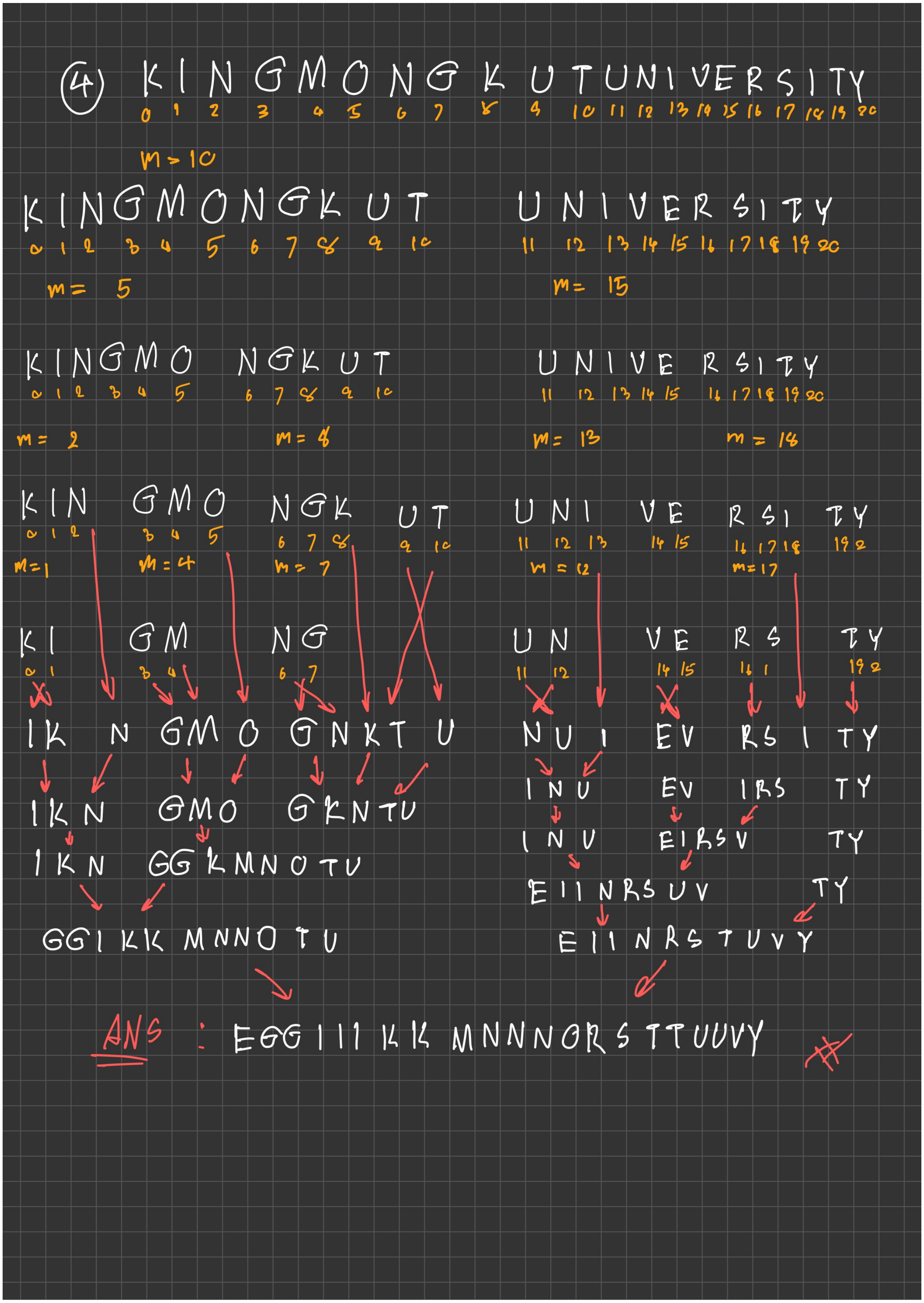
```
int main() {
    char str[64] = "KINGMONGKUTUNIVERSITY";
    int size = strlen(str);
    mergeSort(str, 0, size-1);

    printf("---------------------\n Sorted \n---------------------\n");
    printf("%s", str);                  // output

    return 0;
}
```

Output



```
l = 0 r = 1 IKNGMONGKUTUNIVERSITY
l = 0 r = 2 IKNGMONGKUTUNIVERSITY
l = 3 r = 4 IKNGMONGKUTUNIVERSITY
l = 3 r = 5 IKNGMONGKUTUNIVERSITY
l = 0 r = 5 GIKMNONGKUTUNIVERSITY
l = 6 r = 7 GIKMNOGNKUTUNIVERSITY
l = 6 r = 8 GIKMNOGKNUTUNIVERSITY
l = 9 r = 10 GIKMNOGKNTUUNIVERSITY
l = 6 r = 10 GIKMNOGKNTUUNIVERSITY
l = 0 r = 10 GGIKKMNNOTUUNIVERSITY
l = 11 r = 12 GGIKKMNNOTUNUIVERSITY
l = 11 r = 13 GGIKKMNNOTUINUVERSITY
l = 14 r = 15 GGIKKMNNOTUINUEVRSITY
l = 11 r = 15 GGIKKMNNOTUEINUVRSITY
l = 16 r = 17 GGIKKMNNOTUEINUVRSITY
l = 16 r = 18 GGIKKMNNOTUEINUVIRSTY
l = 19 r = 20 GGIKKMNNOTUEINUVIRSTY
l = 16 r = 20 GGIKKMNNOTUEINUVIRSTY
l = 11 r = 20 GGIKKMNNOTUEIINRSTUVY
l = 0 r = 20 EGGIIIKKMNNNORSTTUUVY
---------------------
 Sorted
---------------------
EGGIIIKKMNNNORSTTUUVY
```

4. จงเรียงลำดับข้อมูลด้านบน จากน้อยไปมาก ด้วยวิธีการ Merge Sort algorithm



ANS : EGG III KK MNNNORS TTUUVY #