PROGRAM AND RESULTS FOR PROBLEM 3 (C PROGRAM)

C-PROGRAM

```
#include <stdio.h>
#include <stdlib.h>
#define MAX_SIZE 1000
typedef struct {
    int index;
    double value;
} Peak;
void find_peaks(double data[], int size, Peak maxima[],
int *max_count, Peak minima[], int *min_count) {
    *max_count = 0;
    *min_count = 0;
    for (int i = 1; i < size - 1; i++) {
        if (data[i-1] < data[i] && data[i] > data[i+1])
{
            maxima[*max_count].index = i;
            maxima[*max_count].value = data[i];
            (*max_count)++;
        } else if (data[i-1] > data[i] && data[i] <
data[i+1]) {
            minima[*min_count].index = i;
            minima[*min_count].value = data[i];
            (*min_count)++;
        }
    }
}
```

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```
void print_peaks(Peak peaks[], int count, const char*
peak_type) {
    printf("%s:\n", peak_type);
    for (int i = 0; i < count; i++) {
        printf("Index: %d, Value: %f\n",
peaks[i].index, peaks[i].value);
    }
    printf("\n");
}


void process_data(const char* filename) {
    FILE *file;
    double data[MAX_SIZE];
    int size = 0;
    Peak maxima[MAX_SIZE], minima[MAX_SIZE];
    int max_count, min_count;
    file = fopen(filename, "r");
    if (file == NULL) {
        printf("Error opening file %s\n", filename);
        return;
    }
    while (fscanf(file, "%lf", &data[size]) != EOF &&
size < MAX_SIZE) {
        size++;
    }
    fclose(file);
    find_peaks(data, size, maxima, &max_count, minima,
&min_count);
```

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```
    printf("Results for %s:\n", filename);
    print_peaks(maxima, max_count, "Maxima");
    print_peaks(minima, min_count, "Minima");
}
int main() {
    process_data("Data_1.txt");
    process_data("Data_2.txt");
    return 0;
}
```

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Results for Data_1.txt:

Maxima:

Index: 52, Value: 53.120603

Index: 109, Value: 30.281294

Index: 134, Value: 50.017201

Index: 177, Value: 22.584571

Index: 186, Value: 22.417276

Index: 193, Value: 23.400012

Index: 211, Value: 48.751133

Index: 242, Value: 18.079650

Index: 296, Value: 47.640551

Index: 369, Value: 45.644860

Index: 423, Value: 23.747387

Minima:

Index: 8, Value: 20.415039

Index: 75, Value: 17.606459

Index: 112, Value: 30.105943

Index: 158, Value: 17.697195

Index: 182, Value: 22.118472

Index: 189, Value: 22.099318

Index: 194, Value: 23.300849

Index: 232, Value: 12.486898

Index: 243, Value: 17.920919

Index: 319, Value: 17.917758

Index: 391, Value: 20.849530

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Results for Data_2.txt:

Maxima:

Index: 55, Value: 240.038595

Index: 93, Value: 27.271921

Index: 133, Value: 237.398106

Index: 214, Value: 241.193972

Index: 292, Value: 265.445242

Index: 385, Value: 263.766556

Index: 421, Value: 33.039741

Minima:

Index: 16, Value: 34.324724

Index: 92, Value: 27.252352

Index: 94, Value: 27.216594

Index: 173, Value: 24.306894

Index: 260, Value: 24.059929

Index: 336, Value: 21.309830

Index: 413, Value: 22.052338