Que 1 Use gprof to analyze and if required optimize the below program:

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

// A function to generate random numbers and store them in an array
void generate_random_numbers(int* array, int size) {
    for (int i = 0; i < size; i++) {
        array[i] = rand() % 1000;
    }
}

// A function to find the sum of elements in an array
int find_sum(int* array, int size) {
    int sum = 0;
    for (int i = 0; i < size; i++) {
        sum += array[i];
    }
    return sum;
}

// A function to find the product of elements in an array
int find_product(int* array, int size) {
    int product = 1;
    for (int i = 0; i < size; i++) {
        product *= array[i];
    }
    return product;
}
```

```
int main() {
    const int size = 10000; // Size of the array (adjust as needed)
    int* array = (int*)malloc(size * sizeof(int));

    generate_random_numbers(array, size);

    int sum = find_sum(array, size);
    int product = find_product(array, size);

    printf("Sum: %d\n", sum);
    printf("Product: %d\n", product);

    free(array);

    return 0;
}
```

Que 2 Write a program to print the factorial of a given number and use gprof to optimize.

Que 3 Write a program for calculator that can perform addition, subtraction, multiplication, division and use gprof to optimize.

Que 4 calculate the area and perimeter of common shapes (circle, rectangle, triangle, square,) and use gprof to optimize.