Department of Computer Science and Engineering
Winter Semester: 2024-25
CS4086E: System Programming Lab

Practice Lab – 17, Feb.'25

1. Create a C program tarea.c that calculates the area of a triangle with integer coordinates.
   a) The program should take three sets of (x, y) coordinates, compute the area using the formula: Area=(|x1· (y2−y3)+x2· (y3−y1)+x3· (y1−y2)|)/2
   b) Use gdb to set a breakpoint at the first scanf line where the program reads the first set of coordinates.
   c) Step through the code line by line using next and print the values of x1 and y1 after the first input.

2. Create a C program fib.c that computes Fibonacci numbers recursively
   a) Set a watchpoint on the variable n to monitor its changes during recursion.
   b) Step through the program and inspect how n changes in each recursive call.

3. Consider the following C -Programming code

```
#include <stdlib.h>
void f(void) {
    int* x = malloc(10 * sizeof(int));
    x[10] = 0;
}
int main(void) {
    f();
    return 0;
}
```

   Debug the program using valgrind memory check.

4. Consider the following program :

```
#include <stdio.h>
    int main() {
    int t;
    int result = 10 / t;
    printf("Result: %d\n", result);
    return 0;
}
```

   a) Use valgrind to identify the issue and then debug the program with gdb to understand the root cause.
   b) Fix the code and verify using both tools.

5. Check whether the following errors are present in the following C program and then resolve errors using gdb.
   a) Memory allocation
   b) Array out-of-bounds access.
   c) Null pointer dereferencing.
   d) Integer overflow.
   e) Uninitialized variables.