PRACTICAL 5

In an operating system, three CPU-intensive processes are ready for execution, which require 10 ns, 20 ns, and 30 ns of CPU time and arrive at times 0 ns, 2 ns, and 6 ns respectively.
Write a program to calculate the total number of context switches needed if the operating system implements a Shortest Job First (Preemptive) scheduling algorithm.
Also calculate the average waiting time for which the processes have to wait before getting the CPU.

```
  UW PICO 5.09                                File: srtf.c                                Modified

#include <stdio.h>

int main() {
    int n = 3;
    int arrival[3] = {0, 2, 6};
    int burst[3]   = {10, 20, 30};
    int remaining[3];
    int waiting[3] = {0, 0, 0};

    for(int i = 0; i < n; i++)
        remaining[i] = burst[i];

    int time = 0, completed = 0;
    int prev = -1;
    int contextSwitches = 0;

    while (completed < n) {
        int shortest = -1;
        int minTime = 9999;

        for (int i = 0; i < n; i++) {
            if (arrival[i] <= time && remaining[i] > 0 && remaining[i] < minTime) {
                minTime = remaining[i];
                shortest = i;
            }
        }

        if (shortest == -1) {
            time++;
            continue;
        }

        if (prev != -1 && prev != shortest)
            contextSwitches++;

        prev = shortest;
        remaining[shortest]--;
        time++;

        if (remaining[shortest] == 0) {
            completed++;
            waiting[shortest] = time - arrival[shortest] - burst[shortest];
        }
    }

    int totalWait = 0;
    for(int i = 0; i < n; i++)
        totalWait += waiting[i];

    printf("Total Context Switches = %d\n", contextSwitches);
    printf("Average Waiting Time = %.2f ns\n", (float)totalWait / n);

    return 0;
}

^G Get Help  ^O WriteOut  ^R Read File  ^Y Prev Pg  ^K Cut Text  ^C Cur Pos
^X Exit      ^J Justify   ^W Where is   ^V Next Pg  ^U UnCut Text ^T To Spell
```

```
Last login: Mon Feb  2 22:54:04 on ttys000
(base) sakshirakhade@Sakshis-MacBook-Air ~ % mkdir os_practical
cd os_practical
mkdir: os_practical: File exists
(base) sakshirakhade@Sakshis-MacBook-Air os_practical % nano srtf.c
(base) sakshirakhade@Sakshis-MacBook-Air os_practical % gcc srtf.c -o srtf
(base) sakshirakhade@Sakshis-MacBook-Air os_practical % ./srtf
Total Context Switches = 2
Average Waiting Time = 10.67 ns
(base) sakshirakhade@Sakshis-MacBook-Air os_practical %
```