

CS19002 PDS Lab, Spring 2007

Lab test 1 (Section 5)

Total points: 30

March 09, 2007

Time: 14:30–16:30

For students with even PC numbers

A sequence s_n is defined for $n \geq 0$ as

$$\begin{aligned} s_0 &= 1, \\ s_1 &= 3, \\ s_n &= 2s_{n-1} - s_{n-2} + 2 + 2^{n-2} \quad \text{for } n \geq 2. \end{aligned}$$

Part 1: Write a recursive function to compute s_n . (10)

```
long int srec ( unsigned int n );
```

Part 2: Write an iterative function to compute s_0, s_1, \dots, s_n . Store these values in an array. (10)

```
void sitr ( long int s[] , unsigned int n );
```

Part 3: One can show that $s_n = n^2 + 2^n$ for all $n \geq 0$. Write a function that computes s_n using this formula. (10)

```
long int sfrm ( unsigned int n );
```

Use the above functions to compute s_{15}, s_{20}, s_{25} . Your `main()` function should be as follows.

```
int main ()
{
    long int s[MAX];

    printf("\nPart 1: Recursive method\n");
    printf("s(%u) = %ld\n", 15, srec(15));
    printf("s(%u) = %ld\n", 20, srec(20));
    printf("s(%u) = %ld\n", 25, srec(25));

    printf("\nPart 2: Iterative method\n");
    sitr(s,25);
    printf("s(%u) = %ld\n", 15, s[15]);
    printf("s(%u) = %ld\n", 20, s[20]);
    printf("s(%u) = %ld\n", 25, s[25]);

    printf("\nPart 3: Formula evaluation method\n");
    printf("s(%u) = %ld\n", 15, sfrm(15));
    printf("s(%u) = %ld\n", 20, sfrm(20));
    printf("s(%u) = %ld\n", 25, sfrm(25));
}
```

Do not use any math library call.