CS19002 PDS Lab, Spring 2007

Lab test 1 (Section 5)

Total points: 30 | March 09, 2007 | Time: 14:30–16:30

For students with <u>odd</u> PC numbers

A sequence t_n is defined for $n \geqslant 0$ as

$$\begin{aligned} t_0 &= 0, \\ t_1 &= 2, \\ t_n &= 4t_{n-1} - 4t_{n-2} + 2^{n+1} \quad \text{for } n \geqslant 2. \end{aligned}$$

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

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

Part 2: Write an iterative function to compute $t_0, t_1, \ldots, t_n$. Store these values in an array. **(10)**

```
void titr ( long int t[] , unsigned int n );
```

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

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

Use the above functions to compute t_{10}, t_{15}, t_{20}. Your `main()` function should be as follows.

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

   printf("\nPart 1: Recursive method\n");
   printf("t(%u) = %ld\n", 10, trec(10));
   printf("t(%u) = %ld\n", 15, trec(15));
   printf("t(%u) = %ld\n", 20, trec(20));

   printf("\nPart 2: Iterative method\n");
   titr(t,20);
   printf("t(%u) = %ld\n", 10, t[10]);
   printf("t(%u) = %ld\n", 15, t[15]);
   printf("t(%u) = %ld\n", 20, t[20]);

   printf("\nPart 3: Formula evaluation method\n");
   printf("t(%u) = %ld\n", 10, tfrm(10));
   printf("t(%u) = %ld\n", 15, tfrm(15));
   printf("t(%u) = %ld\n", 20, tfrm(20));
}
```

Do <u>not</u> use any math library call.
