1. Consider the following program segment

```c
counter = 0;
small = 0;
for(j = 1; j < n; j++)
        small = j;
        counter++;
    }
```

Counting one time unit for each assignment and one unit each time the condition in the ‘for loop’ and the ‘if statement’ is tested, compute the worst case running time of the program.

**Solution**

\[ T(n) = 5(n-1) + 3 + 1 = 5n - 1 \]

2. What are the minimal values of the witnesses \( n \) and \( c \) required to prove that

\[ T(n) = 2^n \]

is \( O(2^n) \).

**Solution**

\[ T(n) = 2^{n+1} \leq c2^n \]

\[ \forall n_0 = 0 \quad 2 \leq c \]

\( c = 2 \)

\( (0, 2) \) is the minimal set of witnesses