CSE 321: Discrete Structures **Winter 2000**

Assignment #4

Due in class: Wednesday, February 2

1. Section 3.2 Exercise 6

2. Section 3.2 Exercise 8

3. Section 3.2 Exercise 12

4. Section 3.2 Exercise 18
   [Be careful, the algebra here can become somewhat messy. It may be greatly simplified by keeping your goal in mind and remembering that this is an inequality which need not be tight.]

5. Define the function $f : \mathbb{N} \longrightarrow \mathbb{N}$ recursively as follows.

$$f(n) = \begin{cases} 1, & \text{if } n = 0; \\ 1 + \sum_{i=0}^{n-1} f(i), & \text{if } n > 0. \end{cases}$$

   Use induction to prove that $\forall n \in \mathbb{N}, f(n) = 2^n$.

   Note that this is *not* the same as the fact (proven as Example 5 of Section 3.2) that $\sum_{i=0}^{n} 2^i = 2^{n+1} - 1$, although you may use the result of this example in your proof.