# CS4182 Homework Exercises 9

1. How would you represent the natural number 5, using just the successor function and 0?

2. What natural number does $sssssss0$ represent?

3. The recursive definition of multiplication is:
   $Mult(x, 0) = 0$
   $Mult(x, Sy) = Mult(x, y) + x$
   Evaluate $Mult(6, 4)$, using the successor function and the recursive definition of the function $Mult$ given above.

4. Prove that $1 + 2 + 2^2 + 2^3 + ... + 2^n = 2^{n+1} - 1$ for all $n \in Nat$ and $n \geq 1$. Hint: Use Proof by Induction over the Natural Numbers