The NEW HW *5A, PART II Assignment

The NEW ASSIGNMENT IS TO WRITE PROOFS
OF THE FOLLOWING TWO UNIVERSAL STATEMENTS.
THESE PROOFS MUST BE STANDARD STRAIGHT-FORWARD
PROOFS USING THE DIRECT PROOF METHOD, THEY
MUST NOT HAVE PROOF-BY-CONTRADICTION ARGUMENTS,
AND THEY MUST NOT HAVE THE DIVISION-INTO-CASES
STRUCTURE.

1. **TO PROVE:** For all integers \( k \geq 3 \),
   \[
   \text{if } 2^0 + 2^1 + 2^2 + \cdots + 2^{k-1} = (2^k - 1),
   \]
   \[
   \text{then } 2^0 + 2^1 + 2^2 + \cdots + 2^k = (2^{k+1} - 1).
   \]

2. **TO PROVE:** For all integers \( k \geq 1 \),
   \[
   \text{if } 10^0 + 10^1 + \cdots + 10^k < 10^{k+1},
   \]
   \[
   \text{then } 10^0 + 10^1 + \cdots + 10^{k+1} < 10^{k+2}.
   \]