Directions. Please submit your answer to the following problem in a LaTeX-prepared document. Class participants are encouraged to prepare solutions in a collaborative mode but to prepare their to-be-submitted write-ups individually. The consequences of sharing files, electronic or otherwise, are discussed in the course syllabus.\footnote{If the wording of this problem was discussed in detail in the classroom, the course instructor expects to see similar phrases and sentences in reading the submissions.}

Please include the problem number along with a statement of the problem in your submission. Please also include your e-mail address.

\textbf{Problem.} Prove that

\[ \sum_{k=0}^{n} r^k = \frac{1 - r^{n+1}}{1 - r}, \quad \forall n \in \mathbb{Z}^+, \quad \forall r \in \mathbb{R}, \quad r \neq 1. \]

(When \( r = 0 \) and \( k = 0 \), one needs the convention: \( 0^0 = 1 \).)