Exercise 1 - Induction

During the development of a software application, the software team started to note that the size of one of the data structures increases according to the value of an integer positive variable n in the following way:

$$\sum_{i=0}^{n} c^i$$

The developers consider that the equation that models the size of the data structure is based on:

$$\frac{c^{n+1}-1}{c-1}, c \neq 1$$

They need now to prove the validity of this equation as they intend that the software application uses a different data structure according to the value of n.

Prove using the induction method the following equation, considering $n \geq 1$ and $c = 3$.

$$\sum_{i=0}^{n} c^i = \frac{c^{n+1}-1}{c-1}, c \neq 1$$