7. For any natural number n,

$$2 + 2^2 + 2^3 + ... + 2^n = 2^{n+1} - 2.$$

Proof (by induction):

Let $P(n)$ be the statement that $2 + 2^2 + 2^3 + ... + 2^n = 2^{n+1} - 2$.

Base Case: for $n = 1$, $2^1 = 2^{1+1} - 2 = 2$. So $P(1)$ is true.

Induction Step: let $n = k$ for some integer k. Assuming $P(k)$ is true we will show that $P(k+1)$ is true.

$P(k) + P(k+1) = (2^{k+1} - 2) + P(k+1)$
$(2 + 2^2 + 2^3 + ... + 2^k) + 2^{k+1} = (2^{k+1} - 2) + 2^{k+1}$
$= 2(2^{k+1}) - 2$
$= 2^{k+2} - 2$

Therefore, $P(k) \Rightarrow P(k+1)$ and, by the principle of induction $P(n)$ is true for all integers n.