Problems.

1. Use the mathematical induction to prove, for any $C \neq 1$,

$$1 + C + C^2 + \cdots + C^n = \frac{1 - C^{n+1}}{1 - C}$$

for all integers $n \geq 0$.

2. Use the mathematical induction to prove that for any $n \geq 1$ and $0 \leq m < n$,

$$\left(\frac{\mathrm{d}}{\mathrm{d}x} - r\right)^n (x^m \mathrm{e}^{rx}) = 0.$$