

Quiz 12

1. $n=1$

$$\frac{3^2-3}{2} = \frac{9-3}{2} = \frac{6}{2} = 3 \checkmark$$

$n=2$ LHS = $3^1 + 3^2 = 3 + 9 = 12$

RHS = $\frac{3^3-3}{2} = \frac{27-3}{2} = \frac{24}{2} = 12 \checkmark$

2. Proof by induction on $n \geq 1$

Base: $n=1$ done above

Step: Assume $3 + 3^2 + \dots + 3^n = \frac{3^{n+1}-3}{2}$

(NTS $3 + 3^2 + \dots + 3^{n+1} = \frac{3^{n+2}-3}{2}$)

Add 3^{n+1} to both sides:

$$3 + 3^2 + \dots + 3^n + 3^{n+1} = \frac{3^{n+1}-3}{2} + 3^{n+1} =$$

$$\frac{3^{n+1}-3}{2} + \frac{2 \cdot 3^{n+1}}{2} = \frac{(2+1)3^{n+1}-3}{2} = \frac{3 \cdot 3^{n+1}-3}{2} =$$

$$\frac{3^{n+2}-3}{2} \checkmark$$