Prove $P(0)$

$$\left(\frac{-1}{2}\right)^0 = \frac{2^{0+1} + (-1)^0}{3 \cdot 2^0}$$

$$1 = \frac{2+1}{3}$$

$$1 = 1 \checkmark$$

$n \geq 0$

$P(k+1)$ for $k \geq n$

$$\left(\frac{-1}{2}\right)^{k+1} = \frac{2^{(k+1)+1} + (-1)^{k+1}}{3 \cdot 2^{k+1}}$$

$$\left(\frac{-1}{2}\right)^k \cdot \left(\frac{-1}{2}\right)^1 = \frac{2^k \cdot 2^2 + (-1)^k \cdot (-1)^1}{3 \cdot 2^k \cdot 2^1}$$

$$\left(\frac{-1}{2}\right)^k \cdot \frac{-1}{2} = \frac{2^k \cdot 4 + (-1)^k \cdot -1}{3 \cdot 2^k \cdot 2}$$

$$\left(\frac{-1}{2}\right)^k = \frac{2^k + (-1)^k}{3 \cdot 2^k}$$

$$\left(\frac{-1}{2}\right)^1 \left(\frac{-1}{2}\right) = \frac{4 \cdot 2^1 + (-1)^1 \cdot -1}{3 \cdot 2^k \cdot 2}$$

$$\frac{-1}{2} \cdot \frac{-1}{2} = \frac{8+1}{12}$$

$$\frac{1}{4} = \frac{9}{12} \times$$