

$$P(n) = a_n = 3 \cdot 2^n - 5^n$$

$$a_n = 7a_{n-1} - 10a_{n-2}$$

$$a_0 = 3 \cdot 2^0 - 5^0 = 3 - 1 = 2 \checkmark$$

$$a_1 = 3 \cdot 2 - 5 = 6 - 1 = 1 \checkmark$$

Basis
Steps

$$a_0 = 2 \quad a_1 = 1$$

Inductive
Step

$$a_n = 7a_{n-1} - 10a_{n-2}$$

Assume $P(n-1)$ & $P(n-2)$
Prove $P(n)$

$$= 7(3 \cdot 2^{n-1} - 5^{n-1}) - 10(3 \cdot 2^{n-2} - 5^{n-2})$$

$$21 \cdot 2^{n-1} - 7 \cdot 5^{n-1}$$

$$- 30 \cdot 2^{n-2}$$

$$+ 10 \cdot 5^{n-2}$$

$$21 \cdot 2^{n-1} - 7 \cdot 5^{n-1}$$

$$- 15 \cdot 2^{n-1}$$

$$+ 2 \cdot 5^{n-1}$$

$$= 6 \cdot 2^{n-1} - 5 \cdot 5^{n-1}$$

$$= 3 \cdot 2^n - 5^n$$