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QUESTION

$y_n = 3^n (A + Bn)$

$y_{n+2} - 6y_{n+1} + 9y_n = 0.$

First we find $y_{n+2} = ?$

So,

$$y_{n+2} = 3^{n+2}(A + Bn+2)$$

5|10

Now, $6y_{n+1} = ?$

$$6y_{n+1} = 6[3^{n+1}(A + Bn+1)$$
$$= 18^{n+1}(6A + 6Bn+1)$$

Now, $9y_n = ?$

$$9y_n = 9(3^n(A + Bn))$$
$$= 27^n(9A + 9Bn)$$

So,

$$= 3^{n+2}(A + Bn+2) - 18^{n+1}(6A + 6Bn+1) + 27(9A + 9Bn)$$

$$= 3^{n+2}A + 3^{n+2}Bn+2 - 108^{n+1}A - 108B_{n+1} + 243A + 243Bn$$

$$= 3^{n+2}A - 108^{n+1}A + 243A + 3^{n+2}B_{n+2}$$