Let d_{ij} , d_{j} , ... be a sequence defined by the formula $d_{ji} = 3^{ij} - 2^{ij}$ for every integer $n \ge 0$. Fill in the blanks to show that d_{ij} , d_{ji} , ... satisfies the following recurrence relation.

$$d_k = 5d_{k-1} - 6d_{k-2}$$
 for every integer $k \ge 2$.

By definition of d_0 , d_1 , d_2 , ..., for each integer k with $k \ge 2$, in terms of k,

It follows that for each integer k 2 2, in terms of k,

$$\begin{aligned} & 5d_{k-1}-6d_{k-2}=5\left(\begin{array}{c} \\ \\ \\ \end{array} \right)-6\left(\begin{array}{c} \\ \\ \end{array} \right) & \text{by substitution from (**) and } \\ & =\left(\begin{array}{c} \\ \\ \end{array} \right)\cdot 3^{k-1}-\left(\begin{array}{c} \\ \\ \end{array} \right)\cdot 2^{k-1}-2\cdot 3\cdot 3^{k-1} & +2\cdot 3\cdot 2^{k-1} \\ & =\left(\begin{array}{c} \\ \\ \end{array} \right)\cdot 3^{k-1}-\left(\begin{array}{c} \\ \\ \end{array} \right)\cdot 2^{k-1}-2\cdot 3\cdot 3^{k-1} & +2\cdot 3\cdot 2^{k-1} \\ & =\left(\begin{array}{c} \\ \\ \end{array} \right)\cdot 3^{k-1}-\left(\begin{array}{c} \\ \\ \end{array} \right)\cdot 2^{k-1} & +2\cdot 3\cdot 2^{k-1} \end{aligned}$$

$$=\left(\begin{array}{c} \\ \\ \end{array} \right)\cdot 3^{k-1}-\left(\begin{array}{c} \\ \\ \end{array} \right)\cdot 2^{k-1} & +2\cdot 3\cdot 2^{k-1} \end{aligned}$$

$$=\left(\begin{array}{c} \\ \\ \end{array} \right)\cdot 3^{k-1}-\left(\begin{array}{c} \\ \\ \end{array} \right)\cdot 2^{k-1} & +2\cdot 3\cdot 2^{k-1} \end{aligned}$$

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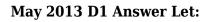
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$$=\left(\begin{array}{c} \\ \\ \end{array} \right)\cdot 3^{k-1}-\left(\begin{array}{c} \\ \\ \end{array} \right)\cdot 2^{k-1} & +2\cdot 3\cdot 2^{k-1} \end{aligned}$$

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