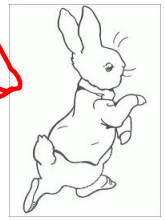
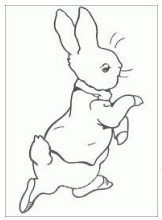
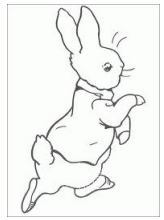
BUNNIES






How many bunnies in month 10?

Month

1 2 3 4 5

Towers of Hanoi

How many moves are needed to solve the towers of Hanoi puzzle with n disks?

SOLVING RECURRENCE RELATIONS

Use induction to show that the purported solutions are really solutions.

(1) $a_n = a_{n-1} + 2, \quad a_0 = 1$

Solution: $a_n = 2n + 1$

(2) $a_n = 2a_{n-1} + 1, \quad a_0 = 1$

Solution: ??

SECOND ORDER HOMOGENEOUS LINEAR RECURRENCE RELATIONS

Solve: $a_n = a_{n-2}$, $a_0 = 1, a_1 = 3$.

$a_n = 6a_{n-1} - 9a_{n-2}$, $a_0 = 1, a_1 = 0$

$a_n = 2a_{n-1} + a_{n-2}$, $a_0 = 0, a_1 = 1$

MORE PROBLEMS

① Solve $a_n = 9a_{n-2}$ where

(a) $a_0 = 6, a_1 = 12$

(b) $a_0 = 6, a_2 = 54$

(c) $a_0 = 6, a_2 = 10$

② Solve $a_n = 8a_{n-1} - 16a_{n-2}$, $a_0 = 1, a_1 = 16$

③ Solve $5a_n = 11a_{n-1} - 2a_{n-2}$, $a_0 = 2, a_1 = -8$.

SECOND ORDER NONHOMOGENEOUS LINEAR RECURRENCE RELATIONS

Solve: $a_n = 2a_{n-1} + 1, \quad a_1 = 1$

$a_n = 3a_{n-1} + 5 \cdot 7^n, \quad a_0 = 2.$

$a_n = -a_{n-1} + n, \quad a_0 = 1/4.$

$a_n = 2a_{n-1} - n/3, \quad a_0 = 1$

MORE PROBLEMS

① Solve $a_n = 5a_{n-1} - 6a_{n-2} + 6 \cdot 4^n$

② Solve $a_n = a_{n-1} + 3n^2$, $a_0 = 7$

By the way, there is another method for solving #2, the method of undetermined coefficients. Idea: recursively substitute: $a_n = a_0 + \sum_{i=1}^{n} f(i) = 7 + 3\Sigma i^2 = \cdots$