

First name \_\_\_\_\_

## Concepts & Notation

- (Chapter 1)  $T_n$ , recurrence (recurrence relation), mathematical induction, basis, solving recurrences

1. Let  $T_n$  be the minimum number of moves to solve the  $n$  disk Towers of Hanoi problem. Find  $T_1$ .

2. Find  $T_2$ .

3. Find  $T_3$ .

4. Explain why  $T_n \leq 2T_{n-1} + 1$ .

5. Explain why  $T_n = 2T_{n-1} + 1$ .

6. What is the *recurrence* for  $T_n$ ?

7. Use the recurrence for  $T_n$  to find  $T_4$ ,  $T_5$  and  $T_6$ .

8. *Solve* the recurrence for  $T_n$ .

9. *Prove* the closed formula for  $T_n$ .