

# AFM Objective 2.05

## Sequences & Series

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Solve all problems neatly on a separate sheet of a paper. YOU MUST SHOW ALL WORK FOR CREDIT. NO WORK=NO CREDIT.

Due Friday, April 21.

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**Problem 1:** The Tower of Hanoi puzzles consist of a stack of wooden disks of graduated sizes on one of three wooden pins. One may move only one disk at a time, and never put a larger disk onto a smaller disk. The goal is to move all the disks to another pin in a minimum number of moves.

- a. Use the link <http://haubergs.com/hanoi> to calculate the minimum number of moves that it takes to relocate  $n$  disks and complete the table.

$n$	1	2	3	4	5	6	7	8
$S(n)$								

- b. Find a **recursive** function to fit this data.  
c. Find an **explicit** formula for this data.  
d. How many steps would it take to move 20 disks?

**Problem 2:** A patient takes 800 mg of ibuprofen for pain. During any 4hr time period his body will metabolize 35% of the medicine.

- a. If the patient takes a dose of medication at 8am and did not repeat the dose, how much medication will be in his blood stream at midnight?  
b. Suppose that same patient repeats that same 800 mg dose every 4hrs, how much medicine will be in his blood stream before he takes his dose at midnight?

**Problem 3:** A sequence is shown below.  $1, \frac{1}{5}, \frac{1}{25}, \frac{1}{125}, \frac{1}{625}, \dots$

- a. What is the sum of the sequence?

**Problem 4:** Create an example of a two series in which one converges and the other diverges. Explain how you know your example fit the criteria for convergence and divergence.

**Problem 5:** In an arithmetic sequence,  $a_1 = 3$  and the common difference is 7. What is the sum of the first 25 terms?