Column of Books[1]

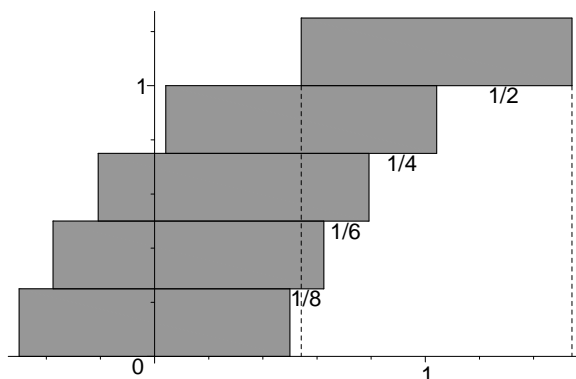Consider the stack of identical books pictured in Figure 1.

FIGURE 1. A precarious stack of books.

Notice the top book on the stack extends completely beyond the footprint of the bottom book. Show that given enough identical books one can create a stack such that the top book extends as far to the right of the bottom book as you want. Let the sequence

(1)
$$\left\{ \frac{1}{2}, \frac{1}{4}, \frac{1}{4}, \frac{1}{8} \right\}$$

be known as the **overhang sequence**. Here are some hints to get you started:

(1) Begin by computing the center of mass of the stack of books in Figure 1. What does the center of mass tell about the stability of the stack?

(2) Assuming all of the books are of uniform size, density and have length 1, find the overhang sequence for n books (you might say that the first book, centered on the origin, is zero, and count from the top book- Therefore, Equation 1 gives the sequence for 3 books).

(3) Compute how far the top book extends beyond the footprint of the bottom book for the arbitrary length overhang sequence in Part 2. Can it continue like that forever? Be specific in your reasons.

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[1]adapted from *Calculus: Early Transcendentals*, 4th ed. Stewart, pg 780