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01 \documentclass{amsart}
02 \usepackage{graphicx}
03
04 \begin{document}
05
06 \noindent Fall 2007 \hfill Math 235 \vspace{.1in}
07
08 \begin{center}
09 {\bf \large \em Column of Books}\footnote{adapted from {\em
10 Calculus: Early Transcendentals}, 4th ed. Stewart, pg 780}
11 \end{center}
12 \vspace{.1in}
13
14 Consider the stack of identical books pictured in Figure \ref{stack}.
15
16 \begin{figure}[hb]
17 \center
18 \includegraphics[width=3in]{stack}
19 \caption{A precarious stack of books.}
20 \label{stack}
21 \end{figure}
22
23 Notice the top book on the stack extends completely beyond the
24 footprint of the bottom book. Show that given enough identical
25 books one can create a stack such that the top book extends as far
26 to the right of the bottom book as you want. Let the sequence
27 \begin{equation}
28 \left\{\frac{1}{2}, \frac{1}{4}, \frac{1}{4}, \frac{1}{8}\right\}
29 \label{Seq1}
30 \end{equation}
31 be known as the {\bf overhang sequence}. Here are some hints to
32 get you started:
33
34 \begin{enumerate}
35
36 \item Begin by computing the center of mass of the stack of books in
37 Figure \ref{stack}. What does the center of
38 mass tell about the stability of the stack?
39
40 \item \label{arb} Assuming all of the books are of uniform size, density
41 and have length 1, find the overhang sequence for  $n$  books (you might say
42 that the first book, centered on the origin, is zero, and count
43 from the top book- Therefore, Equation \ref{Seq1} gives the
44 sequence for 3 books).
45
46 \item Compute how far the top book extends beyond the footprint of the
47 bottom book for the arbitrary length overhang sequence in Part \ref{arb}.
48 Can it continue like that forever? Be specific in your reasons.
49 \end{enumerate}
50
51 \end{document}
52

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