Homework 2

Due Monday, October 6, 2008

1. For each sequence, state whether it is bounded (and if so, above or below) and whether it is monotone (and if so, (non)increasing or (non)decreasing).

   (a) $a_n = 2^n$.

   (b) $b_n = \sin n$.

   (c) $c_n = \dfrac{4n}{n+1}$.

   (d) $d_n = \dfrac{\sqrt{n+1}}{\sqrt{n}}$.

   (e) $e_n = (-1)^n \cdot n!$.

   (f) $f_n = \cos\left(\dfrac{1}{n}\right)$.

   (g) $g_n = 17$.

   (h) $h_n = |5 - n| - n$.

2. Suppose a_n is a bounded sequence. Is the sequence $b_n = 17 \cdot a_n$ also bounded? Why or why not?

3. Suppose a_n is a bounded sequence, and $a_n \neq 0$. Is the sequence $b_n = 1/a_n$ also bounded? Why or why not?

4. Suppose a_n is a decreasing sequence. Is the sequence $b_n = 2a_n + 3$ also decreasing? Why or why not?

5. Suppose a_n is an increasing sequence. Is the sequence $b_n = {a_n}^2$ also increasing? Why or why not?