

## Problem of the Week-7

Posting Date 12/2/03. Submit solutions to Noah Aydin, RBH 309-A (e-mail or hard-copy) by 4 pm on 12/12/07.

Let  $f$  be a positive (that is  $f(x) > 0$  for all  $x$ ), continuously differentiable (i.e.  $f'$  is continuous) function defined for all real numbers, whose derivative is always negative. For any real number  $x_0$ , let the sequence  $x_n$  be obtained by the Newton's method, i.e.,  $x_{n+1} = x_n - \frac{f(x_n)}{f'(x_n)}$ . Show that the limit of  $x_n$  is always  $\infty$ .