MA 281, Honors Mathematical Analysis III, Spring '06.
Extra Homework Sheet # 2.

1. Determine whether the following sequences of functions are pointwise convergent, as $n \to \infty$. If so, find the limiting function f and decide whether the convergence is also uniform. *[Although no proof is required, make sure you are able to explain your answers. Plotting some graphs might help.]*

   (a) $f_n(x) := \left(\frac{x}{n}\right)^3$, on $\mathbb{R}$.

   (b) $f_n(x) := \left(\frac{x}{n}\right)^3$, on $[-1, 1]$.

   (c) $f_n(x) := \left(\frac{x}{n}\right)^3$, on $[-1, 2]$.

   (d) $f_n(x) := \cos(nx)$, on $\mathbb{R}$.

   (e) $f_n(x) := \cos\left(\frac{x}{n}\right)$, on $\mathbb{R}$.

   (f) $f_n(x) := e^{x-n}$, on $[1, 4]$.

   (g) $f_n(x) := x^2 + e^{-n}\sin(x^3 - 2x + 15)$, on $\mathbb{R}$.

   (h) $f_n(x) := e^{-(x-n)^2}$, on $\mathbb{R}$.

   (i) $f_n(x) := x^{2n}$, on $\mathbb{R}^+$.