Homework:
Monday, Jan 10, 2011
§4.5; pg. 176, No. 4, 5, 7, 8, 12, 18, 26, 49.

Label each statement as true or false. If a statement is true, prove it. If not,

(i) give an example of why it is false, and

(ii) if possible, correct it to make it true, and then prove it.

4. A function f is continuous at $x = a$ if and only if $\lim_{x \to a} f(x) = f(a)$.

5. The function $f(x) = (1 - 2^{1/x})^{-1}$ has a jump discontinuity at $x = 0$.

7. Functions $f(x) = \sin(x)$ and $g(x) = \cos(x)$ are uniformly continuous on $\mathbb{R}$.

8. If a function f is uniformly continuous on every bounded interval, then f is uniformly continuous on $\mathbb{R}$.

12. If a function $f : D \to \mathbb{R}$ with $D \subseteq \mathbb{R}$ is continuous and the sequence $\{x_n\}$ is Cauchy in D, then $\{f(x_n)\}$ is Cauchy.

18. A function f exists that is uniformly continuous on (a, ∞) and for which $\lim_{x \to \infty} f(x) = \infty$.

26. The function $f(x) = \begin{cases} x \sin\left(\frac{1}{x}\right) & \text{if } x \text{ is rational} \\ 0 & \text{if } x \text{ is irrational} \end{cases}$ is continuous at the origin.

49. A composition of two continuous functions is continuous.