Real Analysis

Math 310 MWF 10:30-11:25am
Fall 1996 127 Fowler

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#24 Wednesday (11/13/96)

SUMMARY Uniform Continuity and Exam 2 Review

READING §19 (page 100-102)

Warm-Up
Recall the proof of how to show that $f(x) = 1/x^2$ is continuous at $x = x_0$, where $x_0 \in (0, \infty)$

Is there a way to pick δ so that it does NOT depend on x_0? Then we would say that $f(x)$ is UNIFORMLY CONTINUOUS on $(0, \infty)$

Uniform Continuity
19.1 Let f be a real-valued function whose domain is a subset S of $\mathbb{R}$. Then f is **uniformly continuous on** S, *if and only if*

$$\forall \epsilon > 0 \quad \exists \delta > 0 \quad \ni \quad x, y \in S \text{ and } |x - y| < \delta \Rightarrow |f(x) - f(y)| < \epsilon$$

Exercise
Show that if $f(x) = 1/x^2$ is uniformly continuous on (a, ∞) where a is some number $a > 0$

Example
Show that $f(x) = 3x^2 + 1$ is uniformly continuous on $[-2, 2]$.