Math 330 Section 1 - Fall 2016 - Homework 12

Published: Friday, October 28, 2016 *Running total:* 51 *points*
Last submission: Friday, November 11, 2016

A hint for written assignment #3 was added on 11/07.

Status - Reading Assignments:

Here is the status of the reading assignments you were asked to complete by this date.

B/G (Beck/Geoghegan) Textbook:
ch.1 - ch.10 (skim 7.2)

MF lecture notes:
ch.1, ch.2, ch.4-ch.6, ch.8-ch.9 (ch.9.2 carefully)
ch.10.1-ch.10.4; skim ch.10.1.5.

B/K lecture notes (optional reading – good for examples, improved understanding):
ch.1.1, ch.4.1, ch.4.2

New reading assignments:

Reading assignment 1 - due Monday, October 31:
Read carefully MF ch.10.1.6.–10.1.8

Reading assignment 2 - due: Tuesday, November 1:
Read carefully MF ch.10.1.9. (Finish ch.10.1)

Reading assignment 3 - due Wednesday, November 2:
Read carefully MF ch.10.2.1.–10.2.2

Reading assignment 4 - due Friday, November 4:
Read carefully MF ch.10.2.3–ch.10.2.5

Written assignment 1:

Prove that the sequence $x_n := cos(n\pi) + 1/n$ does not have a limit.

Written assignment 2:

Let (X, d) be a metric space and let $u, u', v, v' \in X$. Prove that

$$|d(u, u') - d(v, v')| \leqq d(u, v) + d(u', v').$$

Written assignment 3 (added on 10/29/2016). Prove MF prop.9.10 from the axioms of a norm in def.9.13 (Normed vector spaces): If $x \mapsto \|x\|$ is a norm on a vector space V then so is $x \mapsto p(x) := \gamma\|x\|$ $(\gamma > 0)$.

Hint: I introduced "$p(\cdot)$" for the new norm to help you structure your proofs correctly. Example: The proof of the triangle inequality should look like this:

$x, y \in V \;\Rightarrow\; p(x+y) \;=\; \cdots \leqq \cdots = p(x) + p(y)$. Somewhere in the middle you should make use of the fact that $\|x + y\| \leqq \|x\| + \|y\|$ because the norm $\|\cdot\|$ satisfies the triangle inequality.