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Analysis I
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HW 10

Due: 24 Nov 2015

The problems are written in the format 'chapter.section.problem-number' from Lang's book. Practice problems must be handed in and will be checked for honest effort. Portfolio problems will be graded thoroughly and may be revised until your solutions are of professional quality. Please submit each portfolio problem on a detached sheet of paper with your name on it.

Practice problems:

1. IX.6.5
2. IX.7.1
3. IX.7.4
4. X.3.2
5. X.3.4

Portfolio problems:

P25. Prove that every piecewise constant function $f : [0, 1] \to \mathbb{R}$ can be approximated arbitrarily well (in the sense of an L_1 norm) by a continuous function. (A piecewise constant function is the same as a step map, as defined on page 249 in the book). Is the same statement true if approximation is understood in the L^∞ sense?

P26. Find a regulated map that is not piecewise continuous. Prove that it is regulated, and evaluate its integral. Hint: a piecewise continuous function can only have a finite number of pieces.

P27. Show that any function in $C([0, 1])$ can be approximated arbitrarily well (in a sup norm sense) by a function in $C^1([0, 1])$.