

## PSET 1 - DUE FEBRUARY 8

1. 1.10:22 (6 points)
2. 1.13:11a,b,d (6 points)
3. 2.4:29 (12 points)
4. Last semester we considered *pointwise* and *uniform* convergence of functions. Now we consider a different type of convergence.

Let  $\{f_j\}$  be a sequence of functions in  $L^2(\mathbb{R})$ . We say  $f_j \rightarrow f$  *strongly in  $L^2$*  if there exists  $f \in L^2(\mathbb{R})$  such that

$$\|f_j - f\|_{L^2(\mathbb{R})} \rightarrow 0.$$

Give an example of a sequence  $\{f_j\}$  and a function  $f$  such that  $f_j \rightarrow f$  strongly in  $L^2$  but  $f_j$  does not converge to  $f$  pointwise. Prove both of these facts about your example. (6 points)

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18.024 Multivariable Calculus with Theory  
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