The following problems are due **Wednesday, November 15**.

(1) Finish the proof of Theorem 2.26. By this I mean, prove the content of the final sentence in Theorem 2.26 on page 55.

(2) Let $\mu$ be a finite Borel measure on $\mathbb{R}$. For any $f \in L^1(\mu)$ compute

$$\lim_{n \to \infty} \int_0^1 |f(x)|^{1/n} \, d\mu(x).$$

(3) Do problem 34 on page 63.

(4) Let $(X, \mathcal{M}, \mu)$ be a measure space. Let $\{f_n\}_{n \geq 1}$ be a sequence of complex-valued, measurable functions on $X$. Prove that if $\{f_n\}_{n \geq 1}$ is Cauchy in measure, then there is a subsequence $\{f_{n_j}\}_{j \geq 1}$ for which, given any $j \geq 1$, the set $E_j := \{x \in X : |f_{n_j}(x) - f_{n_{j+1}}(x)| \geq 2^{-j}\}$ satisfies $\mu(E_j) \leq 2^{-j}$.

(5) Do problem 39 on page 63.

(6) Do problem 44 on page 64.