Problems 7.2, 7.8. In Problem 7.14, show not what is asked there but that any Borel set is regular. Note that $\mathcal{B}$ there is our $\mathcal{B}(\mathbb{R})$. Additional problems:

A) Prove that if $\mathcal{U}$ is both a $\lambda$-system and a $\pi$-system then it is a $\sigma$-field.

B) Prove that if $\mu$ and $\nu$ are $\sigma$-finite measures on a measurable space $(\Omega, \mathcal{F})$, $\mathcal{F} = \sigma(\mathcal{E})$, $\mathcal{E}$ is a $\pi$-system, and $\mu = \nu$ on $\mathcal{E}$, then $\mu = \nu$ on $\mathcal{F}$.

In the following two problems, $\mathcal{B}$ is a collection of subsets of $\Omega$ such that $\emptyset \in \mathcal{B}$ and $f$ is a nonnegative function on $\mathcal{B}$ such that $f(\emptyset) = 0$.

C) We call $A \subset \Omega$ an $f$-null set if $f^*(A) = 0$. Prove that $f$-null sets are $f^*$-sets.

D) Prove that if $\mathcal{B}$ is a $\sigma$-field and $f$ is $\sigma$-additive on $\mathcal{B}$ then for any $A \subset \Omega$ there exists $B \in \mathcal{B}$ such that $A \subset B$ and $f^*(A) = f^*(B)$. 

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