If you've been reading along in the text, you've noticed by now that our definition of measurablility is different from your text's. Never-the-less, we will prove all the same (important) theorems. You are welcome to use on this assignment Theorems 16.21 and 16.23, which we will be proving in class shortly.

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1. Carothers 16.40

2. Carothers 16.44

3. Carothers 16.45

4. Carothers 16.48

5. Carothers 16.53

6. Carothers 16.58

7. Carothers 16.60

8. Suppose $E \subseteq \mathbb{R}$. Prove that E is measurable if and only if for any $\epsilon > 0$ there is an open set G and a closed set F such that $F \subseteq E \subseteq G$ and $m^*(G \setminus F) < \epsilon$. (This is your text's definition of measurability.)

9. Use the Caratheodory Condition (property CC) to prove that a set $E \subseteq \mathbb{R}$ is measurable if and only if $E \cap (-n, n)$ is measurable for each $n \in \mathbb{N}$.

10. Revisit 16.28 using the full power of the theorems we've developed for Lebesgue measure. That is, try to come up with a tidy short proof that $m(\Delta_\alpha) = \alpha$.