1. 5 pts. Show that the Cantor set has measure zero.

2. 10 pts. Fix some number $\alpha \in (0, 1)$. Construct a set similar to the canter set by removing at each stage, from the middle third of each interval at the nth stage, an open interval of length $\alpha / 3^n$. Call the remaining set $F$ and show that it is closed, its complement is dense in $[0,1]$ but $m(F) = 1 - \alpha$.

3. 20 pts. Prove proposition 15 on page 63.

4. 20 pts. Show that outer measure is not countably additive. Hint: You will need the Axiom of choice for this.