• Chapter 9 problem 26
• Chapter 9 problem 29
• Chapter 9 problem 31 (do this just for $\mathbb{R}^2$)
• Chapter 11 problem 15

• Problem A: Let $X$ be an uncountable set. Determine if each of the following is a ring, a $\sigma$-ring, or neither:
  1. $\{\emptyset, X\}$.
  2. the collection of all subsets of $X$.
  3. the collection of all finite subsets of $X$.
  4. the collection of all sets that are countable or have countable compliment.
  5. In the case $X = \mathbb{R}$, the collection of all sets that are finite unions of intervals of the form $(a, b]$ with $a, b \in \mathbb{R}$.

• Problem B: Let $X$ be a set.
  1. Let $I$ be any set and for each $i \in I$ let $R_i$ be a ring of subsets of $X$. Prove that $\bigcap_{i \in I} R_i$ is a ring. Similarly prove $\bigcap_{i \in I} R_i$ is a $\sigma$-ring if each $R_i$ is a $\sigma$-ring.
  2. Prove that for every collection $C$ of subsets of $X$ there exists a unique smallest ring $R_1$ containing $C$ and a unique smallest $\sigma$-ring $R_2$ containing $C$. 