MTL762: Probability Theory

Homework I

MTPT refers to Measure Theory and Probability Theory book by Athreya.

1. Let $\mathcal{E}_1 = \{F \subset \mathbb{R} : F$ is finite or $\mathbb{R} \setminus F$ is finite$\}$. Show that the σ-field generated by $\mathcal{E}_1$, $\sigma(\mathcal{E}_1)$, is $\mathcal{E}_2 = \{C \subset \mathbb{R} : C$ or $\mathbb{R} \setminus C$ is countable$\}$.

2. (Different generating sets for Borel σ-algebra on $\mathbb{R}$) Write a complete proof for Example 1.1.6 in MTPT, p. 12.

3. If $\mathcal{C}$ is a π system then λ-system generated by $\mathcal{C}$ is same as the σ-field generated by $\mathcal{C}$.

4. Read and write the proof of Theorem 1.3.2 in MTPT, p. 22.

5. Problems 1.2, 1.5, 1.10, 1.11, 1.12, 1.15, 1.16, 1.17, 1.22, 1.28 and 1.30 in MTPT, pp. 31-38.