

# Assignment 1

(Due on Monday, 09-23)

Below is the list of problems I expect you to do. Please hand in only those marked with an asterisk. All numbers refer to the fourth edition of “Probability: Theory and Examples”.

- Exercise 1.1.6\*
- Exercise 1.2.4\*
- Exercise 1.2.7
- Exercise 1.3.3\*
- Additional Exercise 1: If  $\Omega = \{a, b, c\}$  and  $\mathcal{A} = \{\{a\}\}$ , give all  $\sigma$ -algebras on  $\Omega$  that contain  $\mathcal{A}$  and find  $\sigma(\mathcal{A})$ .
- Additional Exercise 2: Suppose that  $(\Omega, \mathcal{A}, P)$  is a probability space with  $\Omega = \{a, b, c, d, e\}$  and  $\mathcal{A} = 2^\Omega$ . Let  $X$  and  $Y$  be the real-valued random variables defined by

$$X(\omega) = \begin{cases} 1, & \text{if } \omega \in \{a, b\}, \\ 0, & \text{if } \omega \notin \{a, b\}, \end{cases} \quad Y(\omega) = \begin{cases} 2, & \text{if } \omega \in \{a, c\}, \\ 0, & \text{if } \omega \notin \{a, c\}. \end{cases}$$

Give explicitly (by listing all the elements) the  $\sigma$ -algebras  $\sigma(X)$  and  $\sigma(Y)$  generated by  $X$  and  $Y$ , respectively.