1. Exercise 13.7 from the textbook.

2. Let $(S, d)$ be a metric space and $E \subseteq S$. The interior $E^o$ of $E$ is defined by:

$$E^o = \{ s \in E \mid \exists r > 0 : B_r(s) \subseteq E \}$$

Show that $E^o$ is open and that the set $E$ is open if and only if $E = E^0$.

3. Exercise 13.10 (a) and (b) from the textbook.

4. Let $(S, d)$ be a metric space and $E \subseteq S$. The closure $\overline{E}$ of $E$ is defined by:

$$\mathcal{F} = \{ F \subseteq S \mid F \text{ is closed and } E \subseteq F \}, \quad \overline{E} = \bigcap_{F \in \mathcal{F}} F.$$

Show that $\overline{E}$ is closed and that the set $E$ is closed if and only if $E = \overline{E}$. Moreover

$$\overline{E} = \{ s \in S \mid \exists (s_n)_{n \in \mathbb{N}} \subseteq E \text{ convergent to } s \}.$$ 

5. Exercises 13.9, 13.12, 13.13 and 13.15 from the textbook.