1. Exercise 12.a

2. Exercise 12.b

3. Exercise 12.1

4. Define a player (say player i) to be a **dummy** in a game with characteristic function v, if $v(S \cup \{i\}) = v(S)$ for all coalitions S. In particular, $v(i) = 0$. In other words, a dummy does not help (or harm) any coalition. Prove that if player i is a dummy, $1 \leq i \leq n$, and if $(x_1, \ldots, x_n)$ is in the core, then $x_i = 0$.

5. **United Nations Security Council.** In the United Nations Security Council, there are 15 voting nations, including the five permanent members. [The five permanent members are United States, Russia, China, United Kingdom, and France, in case you are interested.] To pass a resolution, 9 out of the 15 votes are needed, but each of the five permanent members has veto power. One way of viewing this situation is as a weighted voting game in which each of the five permanent members gets 7 votes and each of the other 10 nations gets 1 vote, and 39 votes are required to pass a resolution. Find the Shapley value.