Use *synchronized* to answer the following questions. Relevant lecture notes can be found at Spectrum.

1. Write a program that simulates the cleaning process of a room. Cleaners can enter the room one at the time and can enter only if no guests are in the room. If the room is occupied, the cleaner will wait until he/she could enter the room. A guest, instead, can only access the room if no cleaners are in it and a maximum of 6 guest can be allowed in the room at once. If the room is occupied by a cleaner or by 6 other guests, the guest will wait until he/she could enter the room. Use the built-in synchronization mechanism in Java to solve the problem.

2. A bank account allows different users to perform deposit or withdrawal at the same time. This requires the update of account balance to be properly controlled, or otherwise, error may occur. For example, if two deposits are performed concurrently, the account's balance must be the sum of existing balance and the two deposits. Write a Java program that allows multiple deposits/withdrawals to be performed as threads. Provide control mechanism to ensure the account balance is always correct.