SPAB – assignment 02

Johanna Becher, 2576526

Lisa Raber, 2578464

Task 2.2

Hilbert's Hotel: countable number of rooms occupied

1) One more guest:
   Move guest from room 1 to room 2, guest from room 2 to room 3, …
   (possible because adding a constant on countable infinity is still a countable infinity)
   Move new guest to room 1

2) Bus with countable number of guests:
   Move all guests in a room with a number twice their current room number.
   (multiplying a countable infinity with a constant is still a countable infinity)
   All rooms with odd numbers are free (countable infinity) for the guests in the bus.

3) Countable number of busses with countable number of guests:
   Move all guests in a room with a number twice their current room number (odd room numbers are free now)
   Put guests from bus i in the rooms p_i, p_i^2, p_i^3,… with p_i = i+1 th prime number

(Note: all guests have to move at the same time, otherwise it would take a countable infinite amount of time)