Automata – Exercises

1. Consider an arbiter controlling the access to a shared resource that is used by two clients. We use the following atomic propositions to model this system:

   - r_i for $i = 1, 2$, used by Client i to request access to the shared resource, and
   - g_i for $i = 1, 2$, used by the arbiter to grant access to Client i.

   Specify Büchi automata capturing the following properties of sequences over $\mathbb{P}(r_1, r_2, g_1, g_2)$:

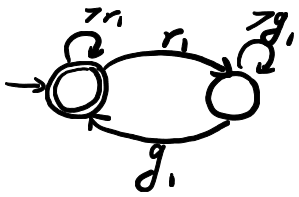
   (a) Every request of Client 1 is eventually granted, e.g., every r_1 is followed by a g_1.

   (b) At most one client can access the resource at a time (mutual exclusion), i.e., g_1 and g_2 are never true at the same time.

   (c) Access is only granted to Client 1, if there is a pending request of Client 1 (no spurious grants), i.e., whenever g_1 is true, then only if r_1 is true at an earlier moment in time and there is no moment between where g_1 is true.

2. Give formulas of temporal logic capturing the three properties above.

1. a)



b)

c)