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Week 7 exercises

Now it's time to put into practice the concepts that you have learnt so far in Week 7. Attempt the following exercises. If you get stuck, you can refer to the hints and tips on the next page.

Please note that these exercises are optional, further practice – but we strongly recommend that you engage with them in order to test your knowledge and see where you might need to do additional study.

1. Write the paths representing parsing of the following input by the automaton depicted below. State if the input is accepted or rejected.

   a. abaa

   b. abbab

   c. babab

   d. baaba

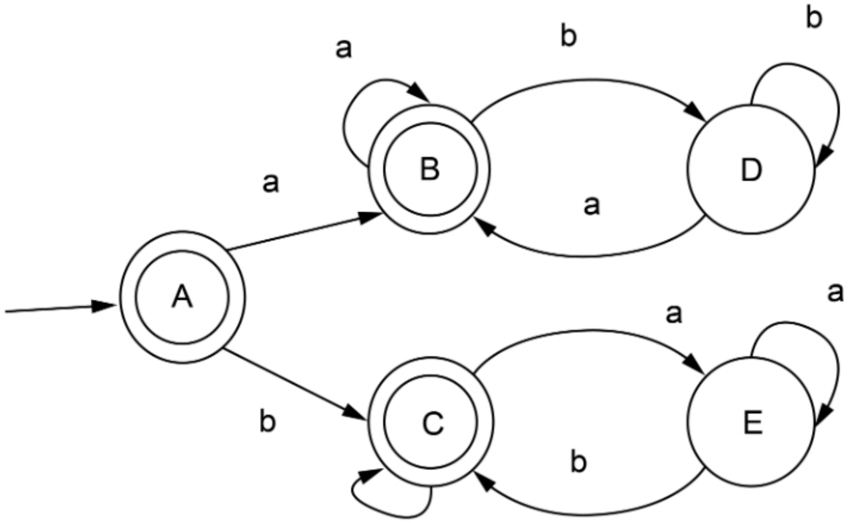
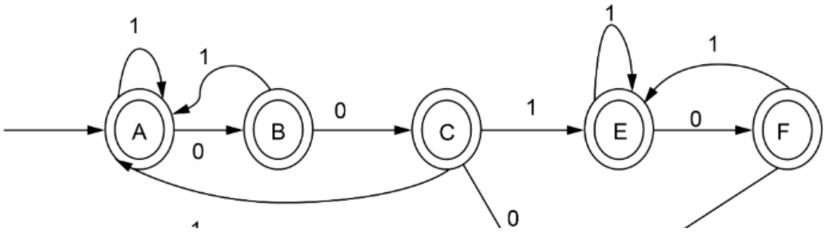


Diagram description: This automaton has five states. The starting state is A. The accepting states are A, B and C. The transitions are: From A to B labelled with a. From A to C labelled with b. From B to B (self-edge) labelled with a. From B to D labelled with b. From D to D (self-edge) labelled with b. From D to B labelled with a. From C to C (self-edge) labelled with b. From C to E labelled with a. From E to E (self-edge) labelled with a and from E to C labelled with b.

2. Considering the following automaton, give two example strings that should be accepted and two strings that should be rejected by this automaton. What is the language accepted by this automaton?



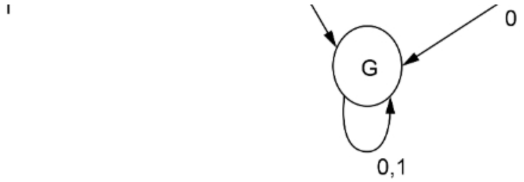


Diagram description: There are six states. State ‘A’ is the starting state. States ‘A’, B’, ’C’, ’E’ and ‘F’ are accepting states. There is a self-edge from A to A labelled with 1. There is a transition from A to B labelled with 0. Other transitions are: from B to A labelled with 1. From B to C labelled with 0. From C to A labelled with 1. From C to E labelled with 1. Self-edge from E to E labelled with 1. From C to G labelled with 0. From E to F labelled with 0. From F to E labelled with 1. From F to G labeled with 0 and finally self-edge from G to G labelled with 0 and 1.

3. Over {a,b} design an automaton that accepts all strings starting with ‘a’.

4. Over {1,2,3} design an automaton that accepts all numbers that are divisible by 3.

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