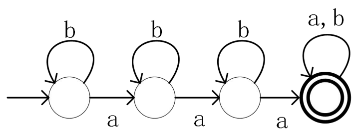
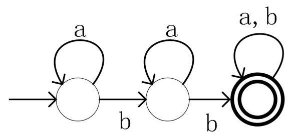
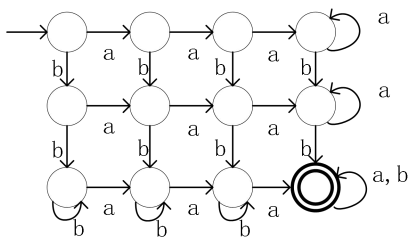
1.4

(a) The following are DFAs for the two simpler languages:

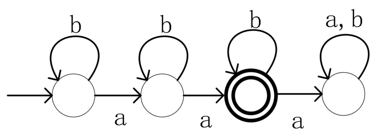


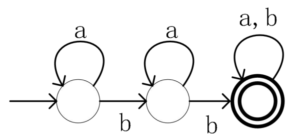


Combining them using the intersection construction gives the DFA:

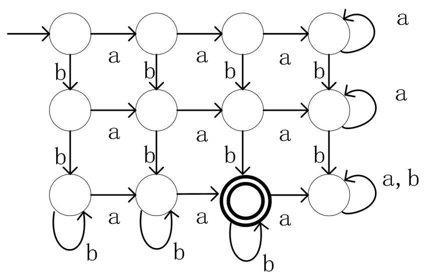


(b) The following are DFAs for the two simpler languages:

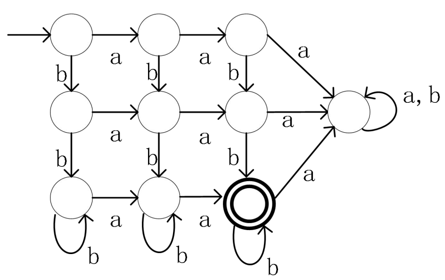




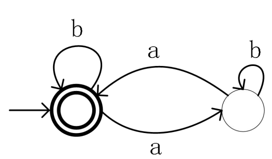
Combining them using the intersection construction gives the DFA:

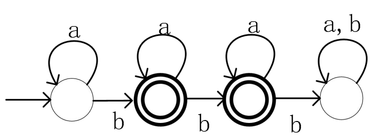


It can be combined to give:

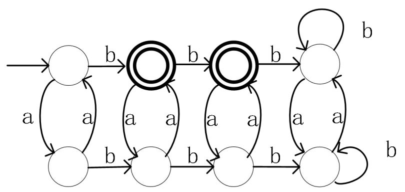


(c) The following are DFAs for the two simpler languages:

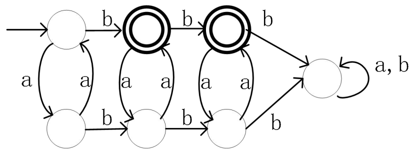




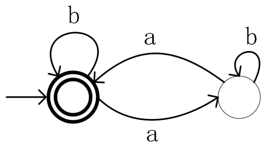
Combining them using the intersection construction gives the DFA:

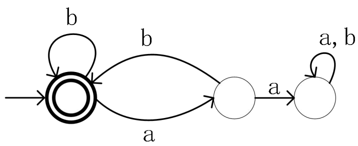


It can be combined to give:

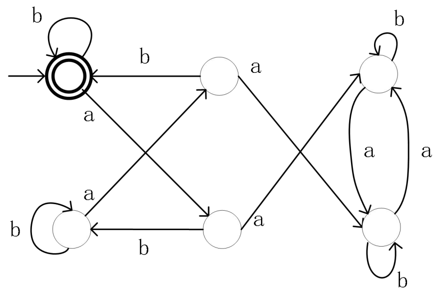


(d) The following are DFAs for the two simpler languages:

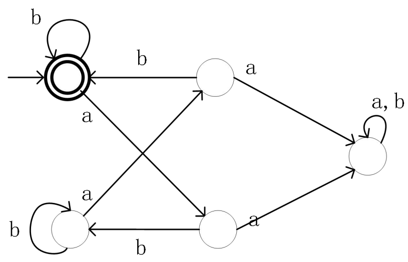




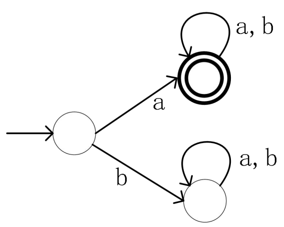
Combining them using the intersection construction gives the DFA:

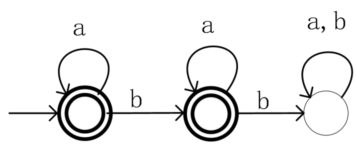


It can be combined to give:

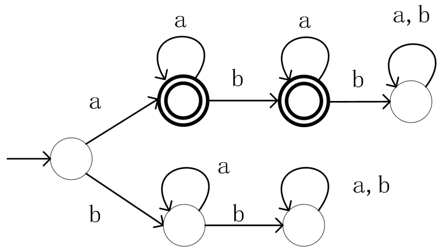


(e) The following are DFAs for the two simpler languages:

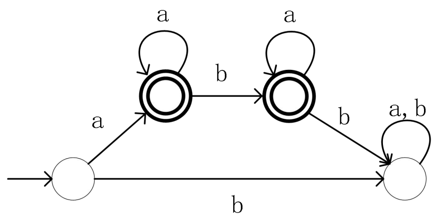




Combining them using the intersection construction gives the DFA:

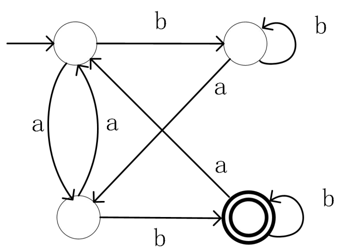


It can be combined to give:

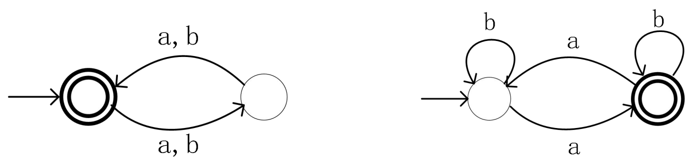


(f) The following are DFAs for the two simpler languages:

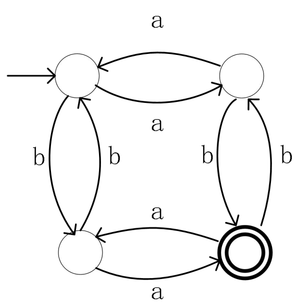
Combining them using the intersection construction gives the DFA:



(g) The following are DFAs for the two simpler languages:



Combining them using the intersection construction gives the DFA:



1.16

(a)

Construct a DFA M containing state set: {∅,{1},{2},{1,2}}

i. First, determine the start and accept states of M:

Start state is {1}

New accept states contains origin accept state, {{1},{1,2}}

ii. Determine each state in N

δ(1,a)={1,2}, δ(1,b)={2}

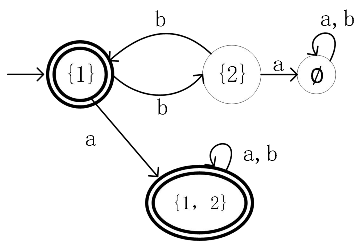
δ(2,a)= ∅, δ(2,b)={1}

So in DFA M:

δ'({1,2},a)={1,2}, δ'({1,2},b)={1,2}

δ'(∅,a)= ∅, δ'(∅,b)= ∅

iii. Obtaining



(b)

Construct a DFA M containing state set: {∅,{1},{2},{3},{1,2},{1,3},{2,3},{1,2,3}}

i. First, determine the start and accept states of M:

Start state is E({1}), including states reached from 1 along ε arrows and 1 itself.

Thus, start state = {1,2}

New accept states contains origin accept state, {{2},{1,2},{2,3},{1,2,3}}

ii. Determine each state in N

δ(1,a)={3}, δ(1,b)= ∅

δ(2,a)={1,2}, δ(2,b)= ∅

δ(3,a)={2}, δ(3,b)= {2,3}

So in DFA M, consider ε:

δ'({1,2},a)={1,2,3}, δ'({1,2},b)= ∅

δ'({1,3},a)={2,3}, δ'({1,3},b)= {2,3}

δ'({2,3},a)={1,2}, δ'({2,3},b)= {2,3}

δ'({1,2,3},a)={1,2,3}, δ'({1,2,3},b)= {2,3}

δ'(∅,a)= ∅, δ'(∅,b)= ∅

iii. Simplify DFA by removing the unnecessary states {1}, {2}, {3} and {1,3}.