

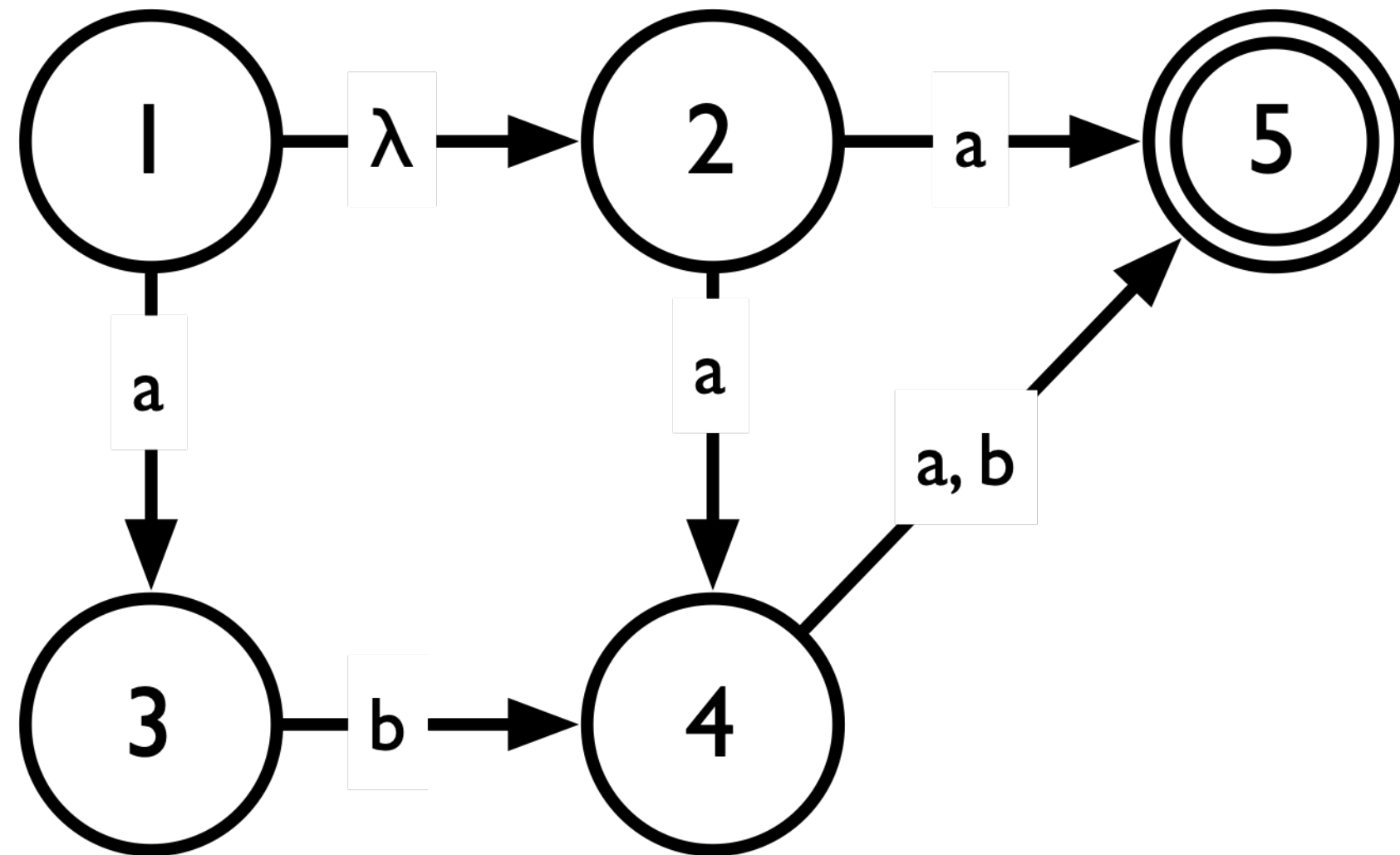
**from NFAs to DFAs**

# converting nfas to dfas

- Can convert NFAs to deterministic finite automata (DFAs)
  - No choices — never a need to “split” pointers
- Initial idea: simulate NFA for all possible inputs, any time there is a new configuration of pointers, create a state to capture it
  - Pointers at states 1, 3 and 4 → new state {1, 3, 4}
- Trying all possible inputs is impractical; instead, for any new state, explore all possible next states (that can be reached with a single character)
  - Process ends when there are no new states found
  - This is an example of a fixed-point algorithm (we'll see many more of these in the future)

# example

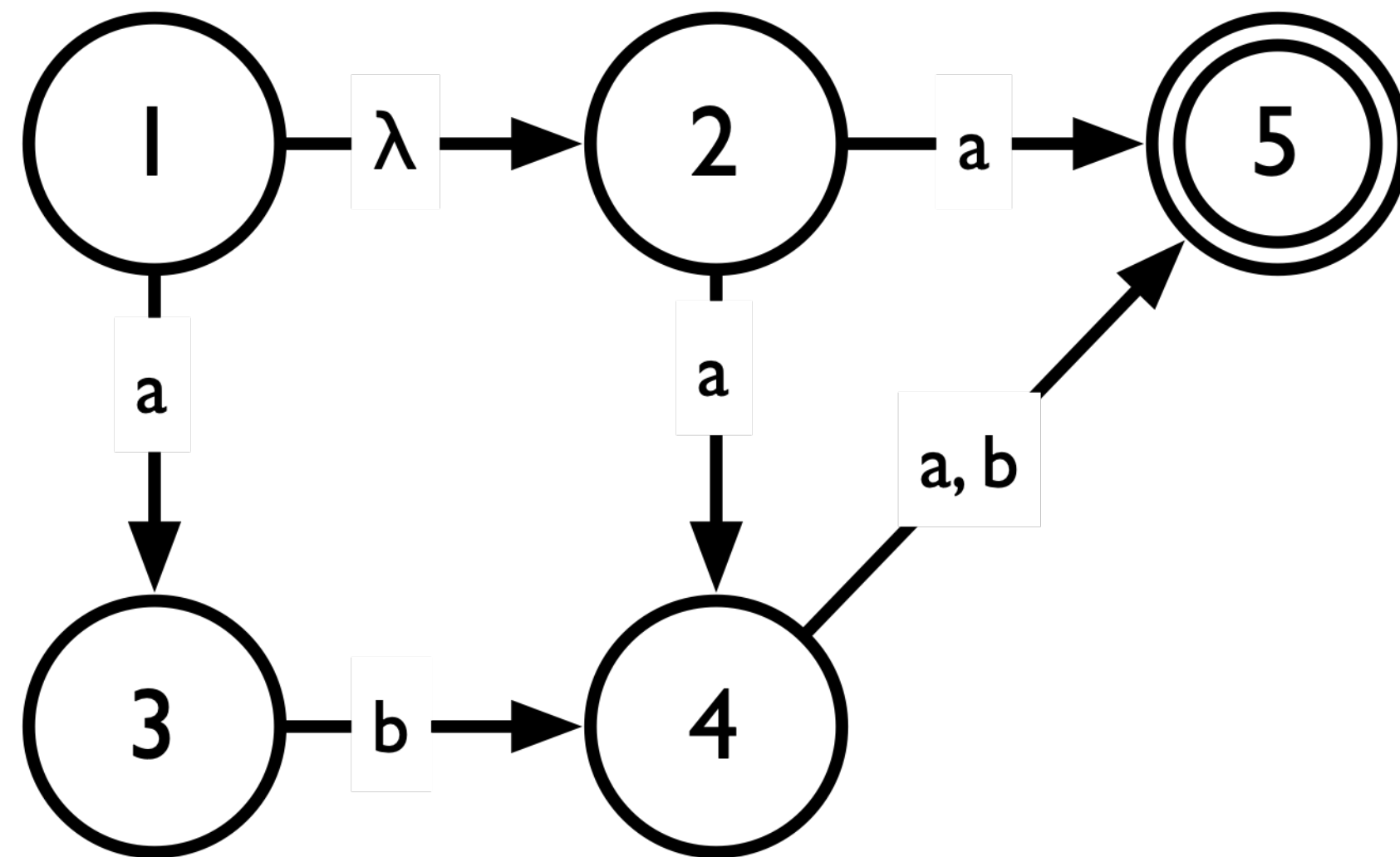
- Convert the following into a DFA



<i>State</i>	<i>a</i>	<i>b</i>

# example

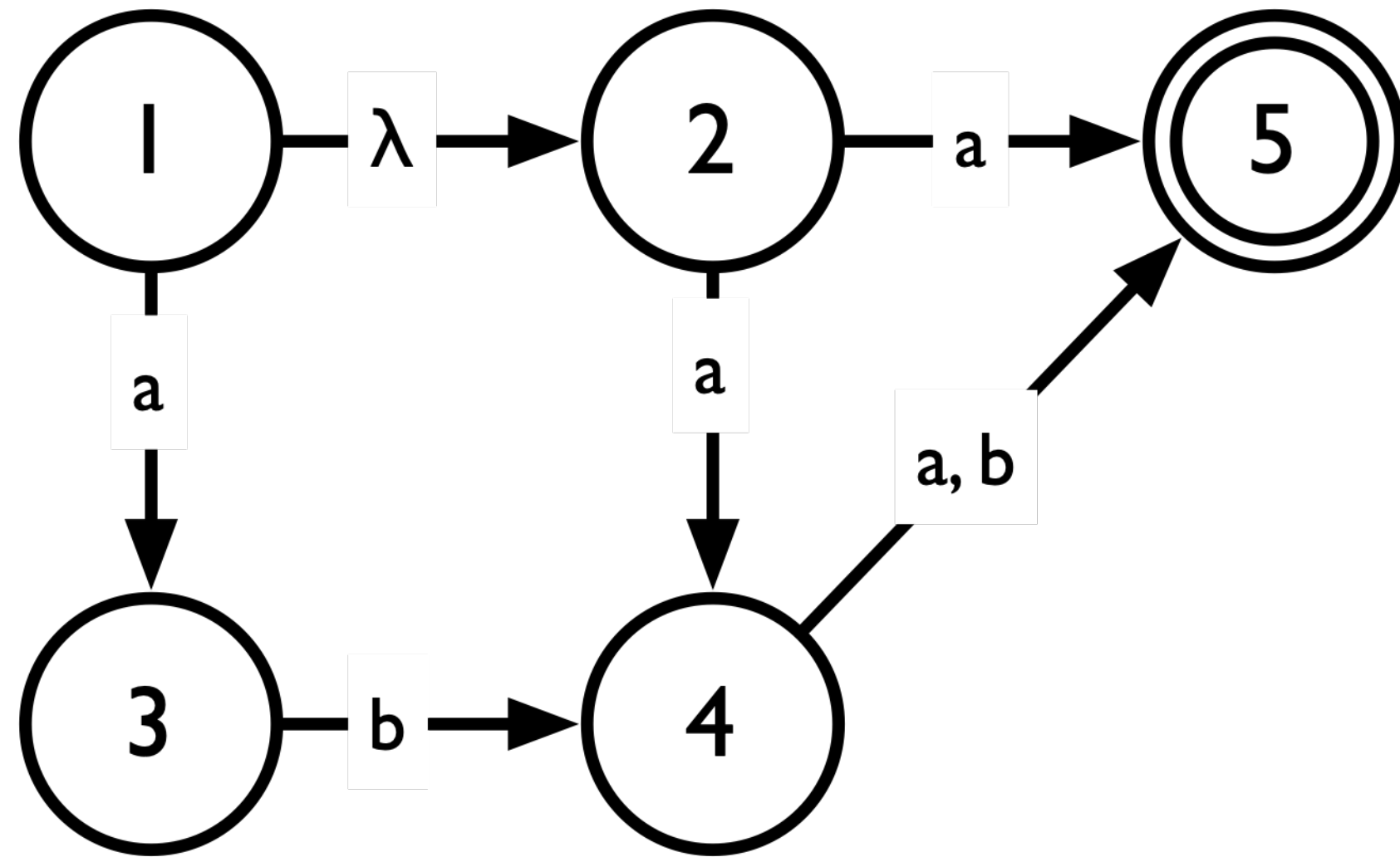
- Convert the following into a DFA



<i>State</i>	<i>a</i>	<i>b</i>
12		

# example

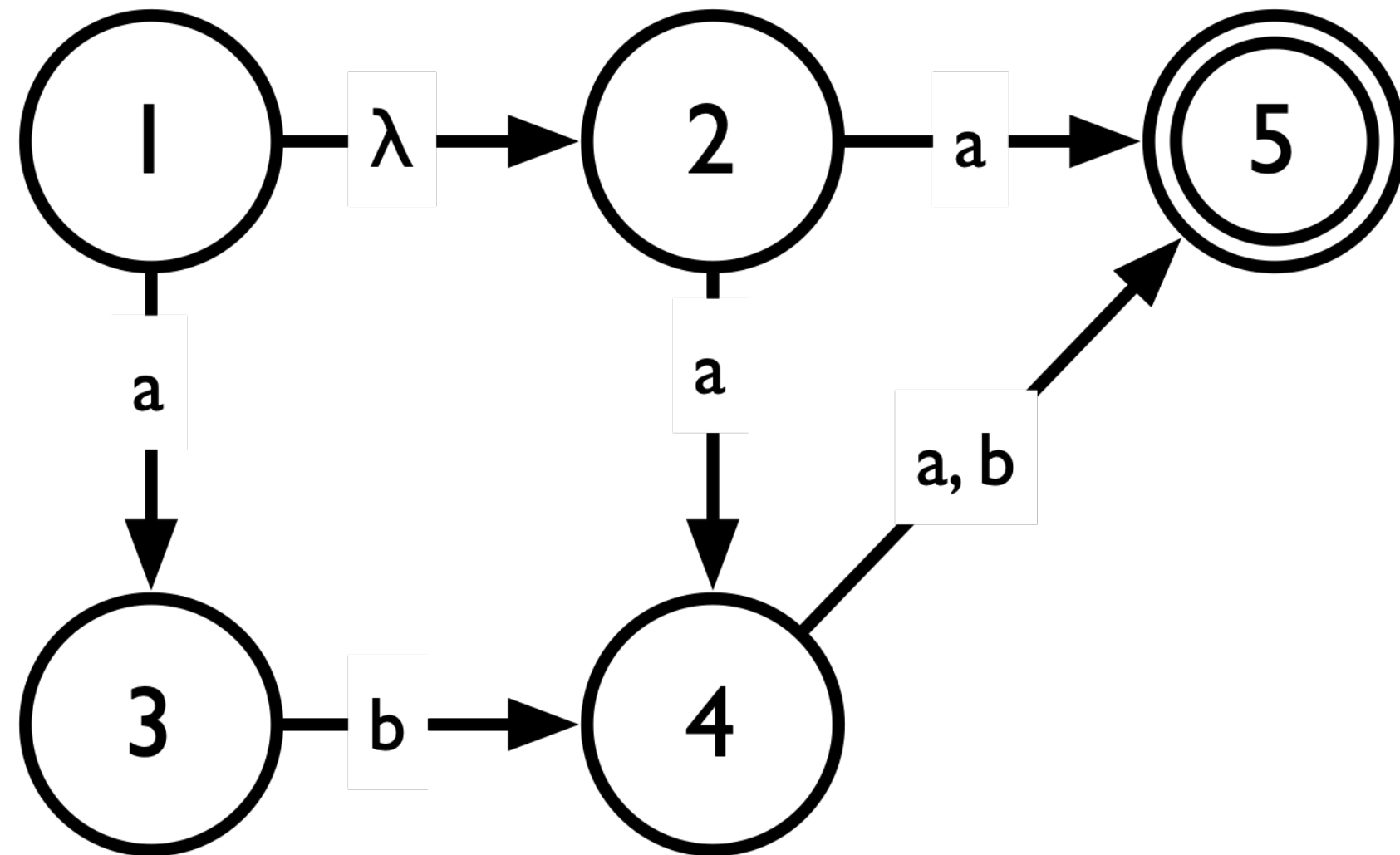
- Convert the following into a DFA



<i>State</i>	<i>a</i>	<i>b</i>
12	345	

# example

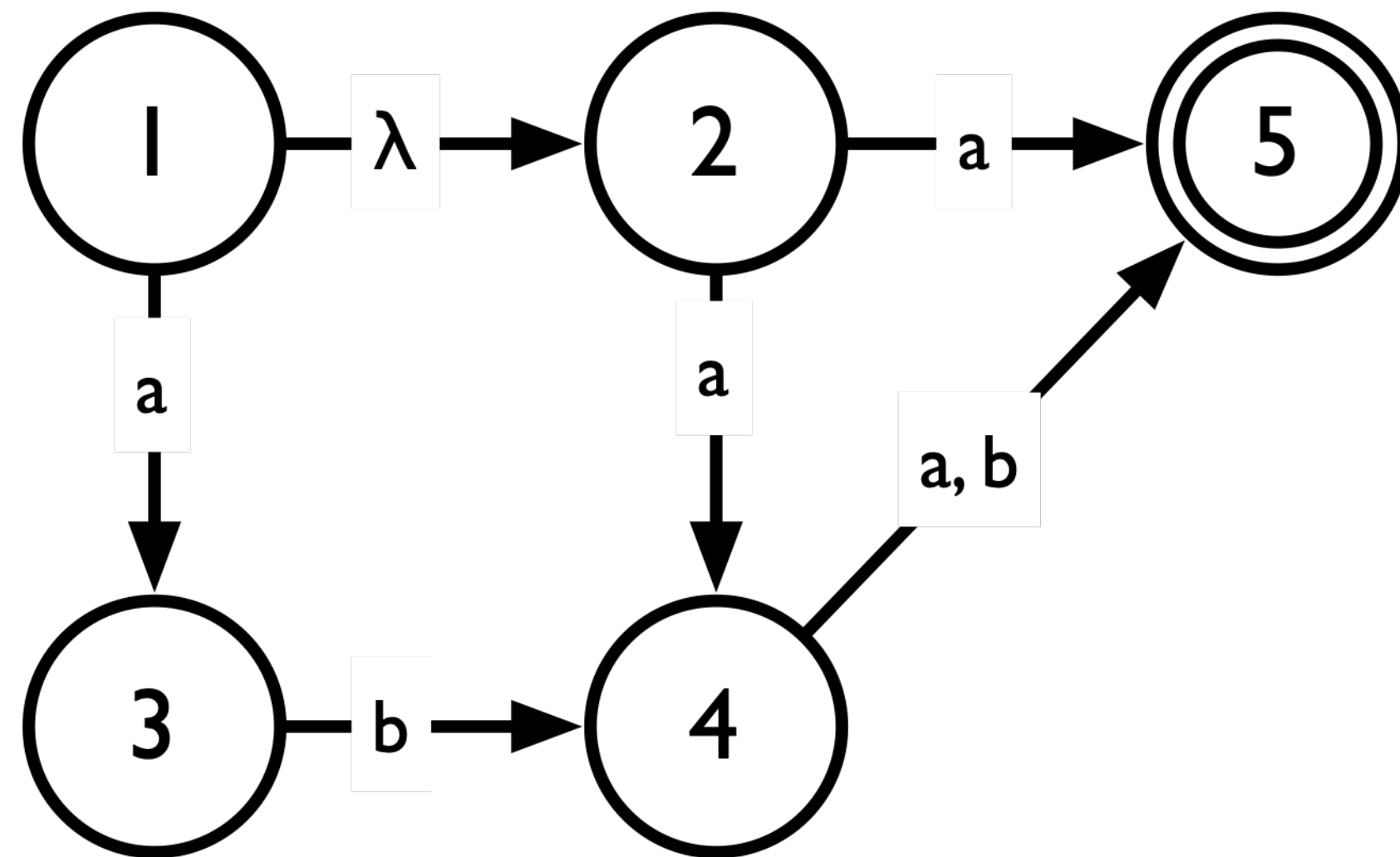
- Convert the following into a DFA



<i>State</i>	<i>a</i>	<i>b</i>
12	345	∅

# example

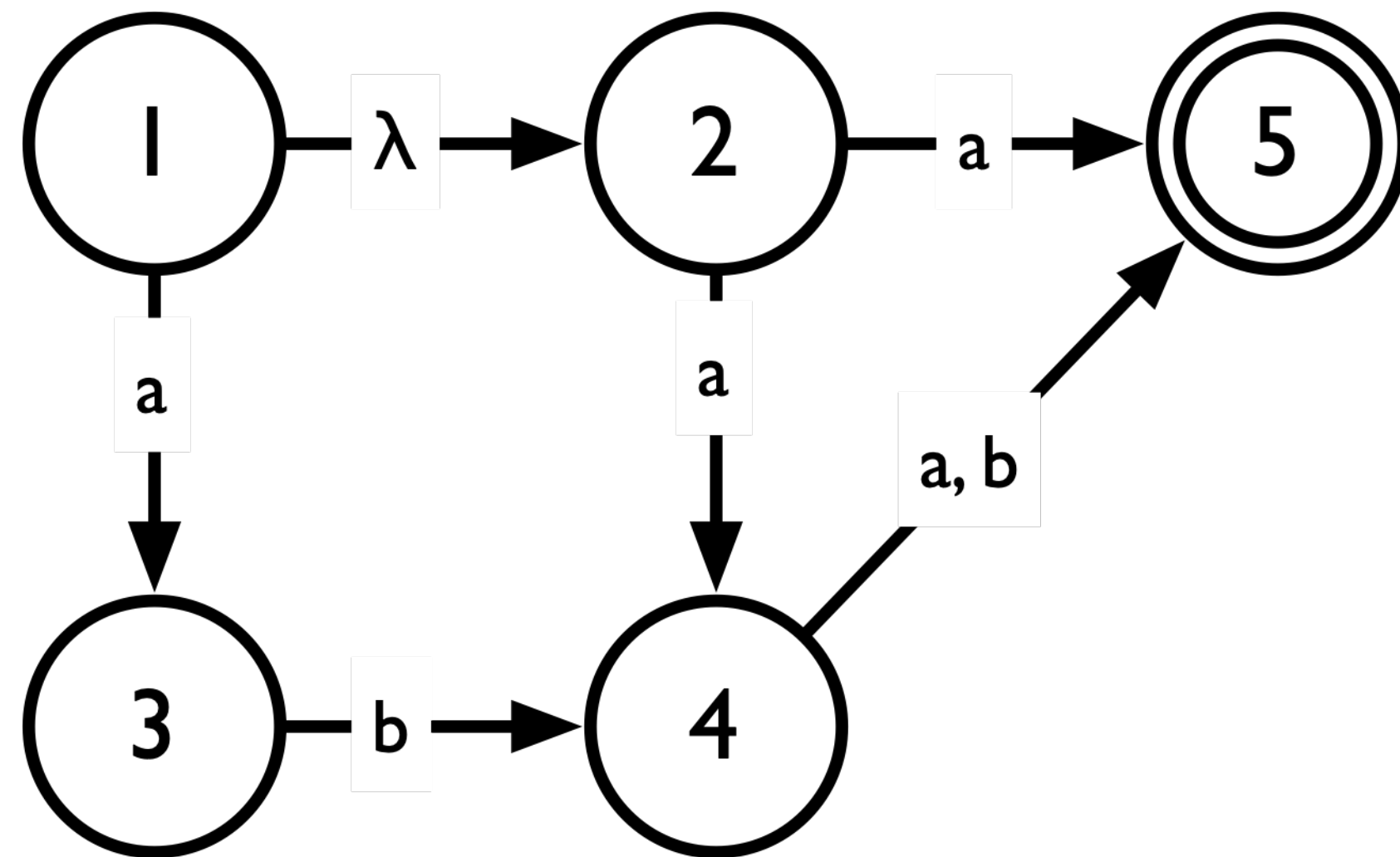
- Convert the following into a DFA



<i>State</i>	<i>a</i>	<i>b</i>
12	345	∅
345		

# example

- Convert the following into a DFA

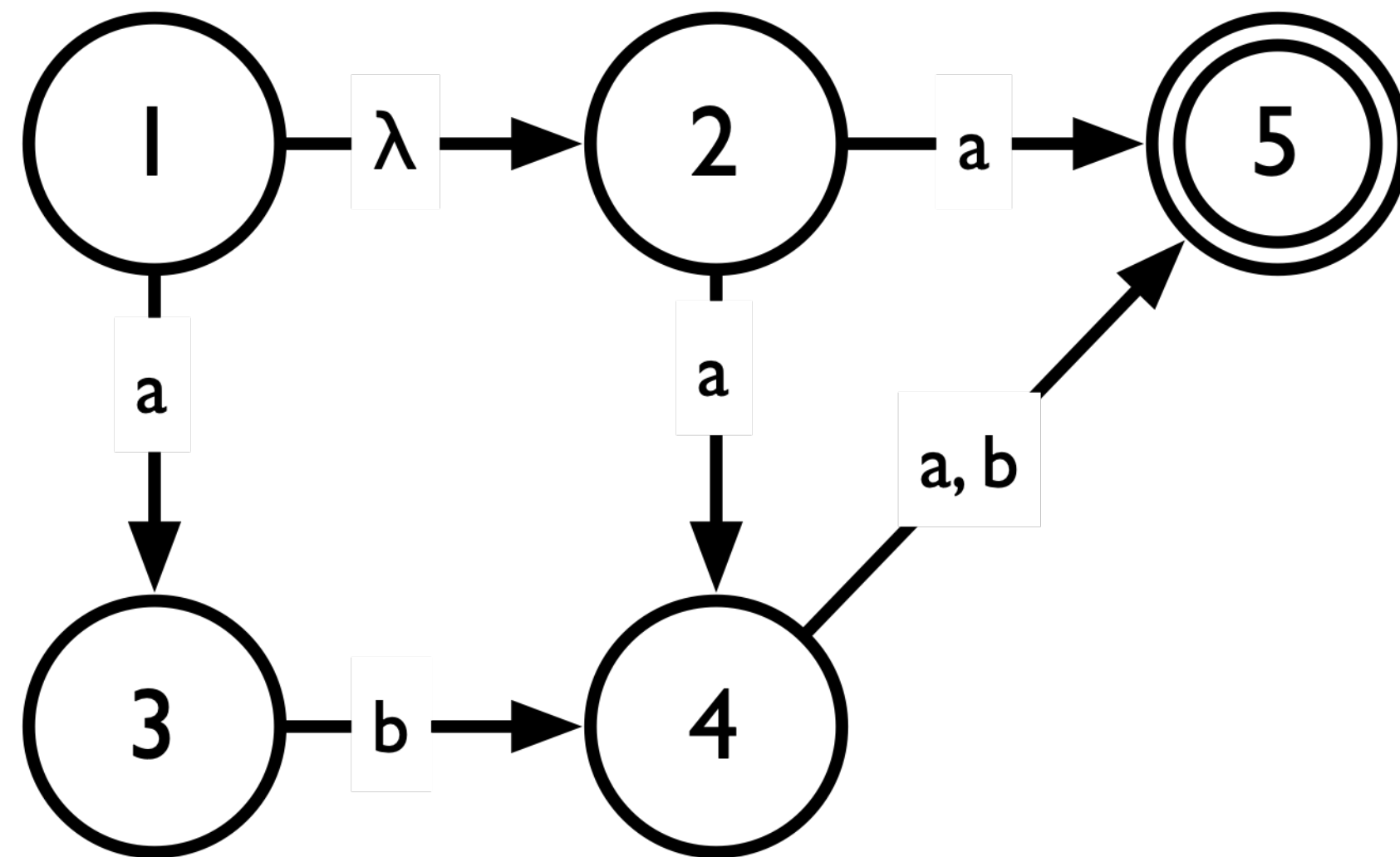


<i>State</i>	<i>a</i>	<i>b</i>
12	345	∅
345	5	



# example

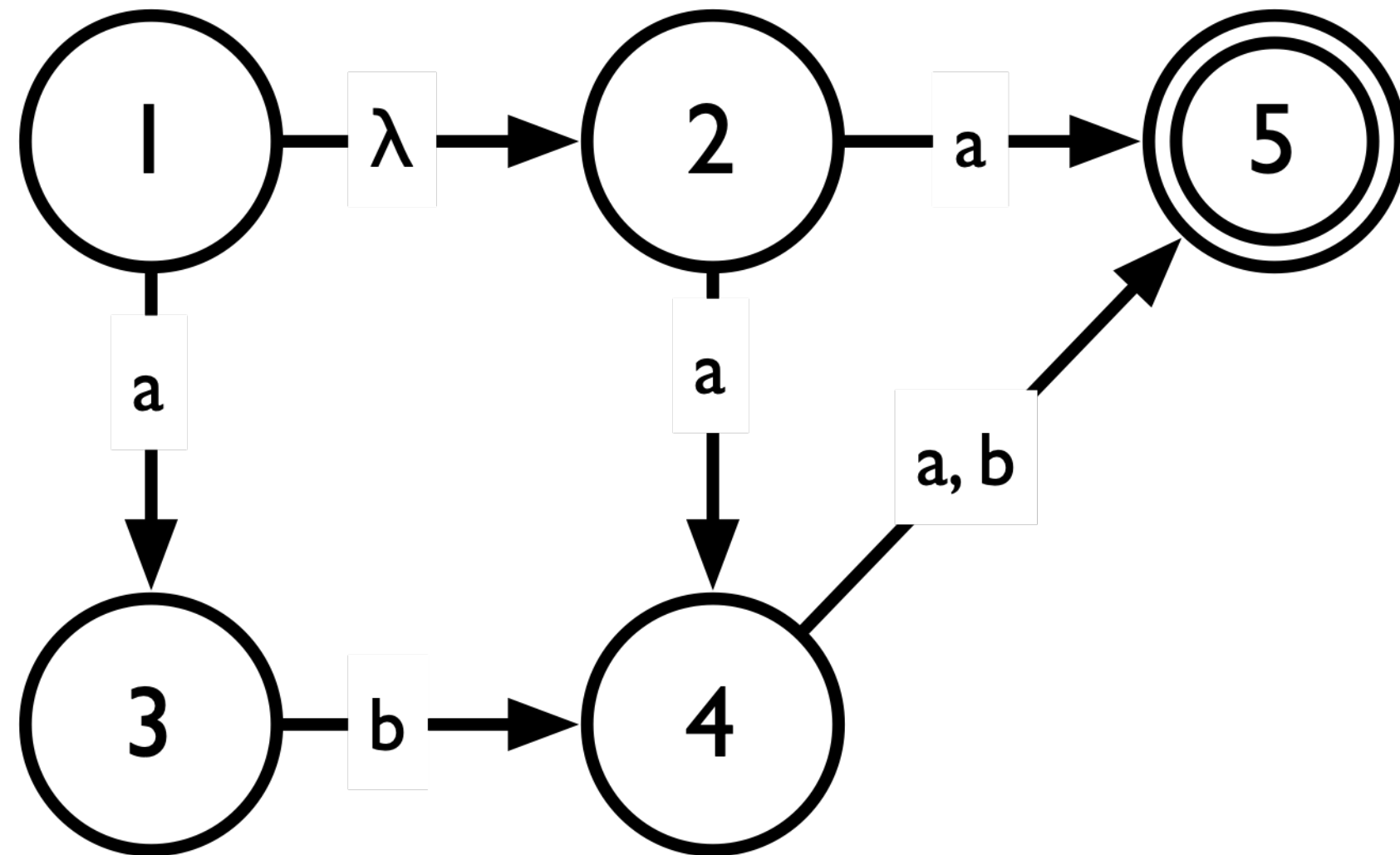
- Convert the following into a DFA



<i>State</i>	<i>a</i>	<i>b</i>
12	345	∅
345	5	45

# example

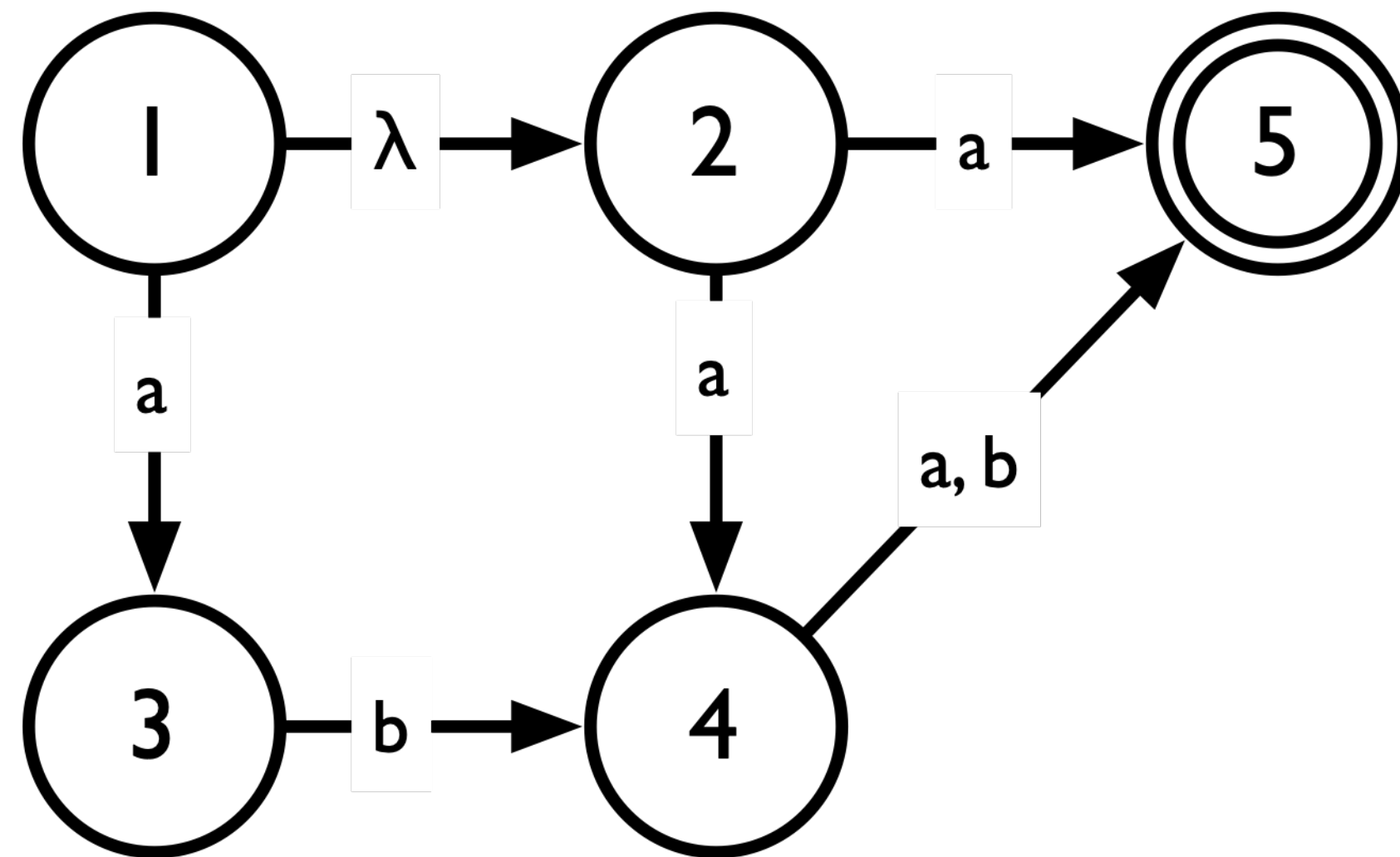
- Convert the following into a DFA



<i>State</i>	<i>a</i>	<i>b</i>
12	345	∅
345	5	45
5		

# example

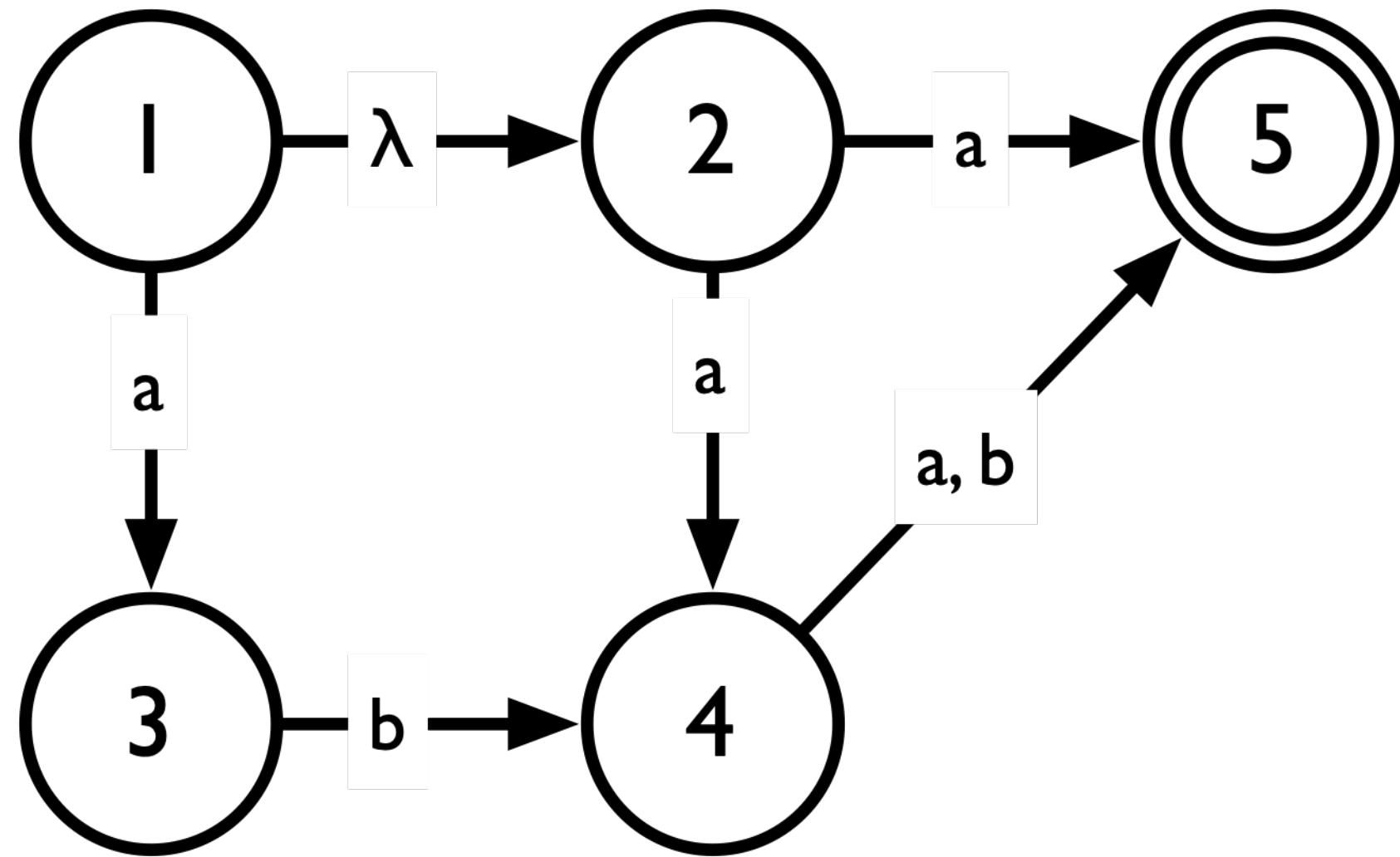
- Convert the following into a DFA



<i>State</i>	<i>a</i>	<i>b</i>
12	345	$\emptyset$
345	5	45
5	$\emptyset$	$\emptyset$

# example

- Convert the following into a DFA



<i>State</i>	<i>a</i>	<i>b</i>
12	345	∅
345	5	45
5	∅	∅
45	5	5