Design NDFA's which accept:

L_1 = { w $\in$ {a, b}* : w contains one or more of aabb, abab, or abba as substrings}

L_2 = { w $\in$ {0, 1}* : w= u v for some u such that the length of u is even and for some v which contains 3k+1 0's}

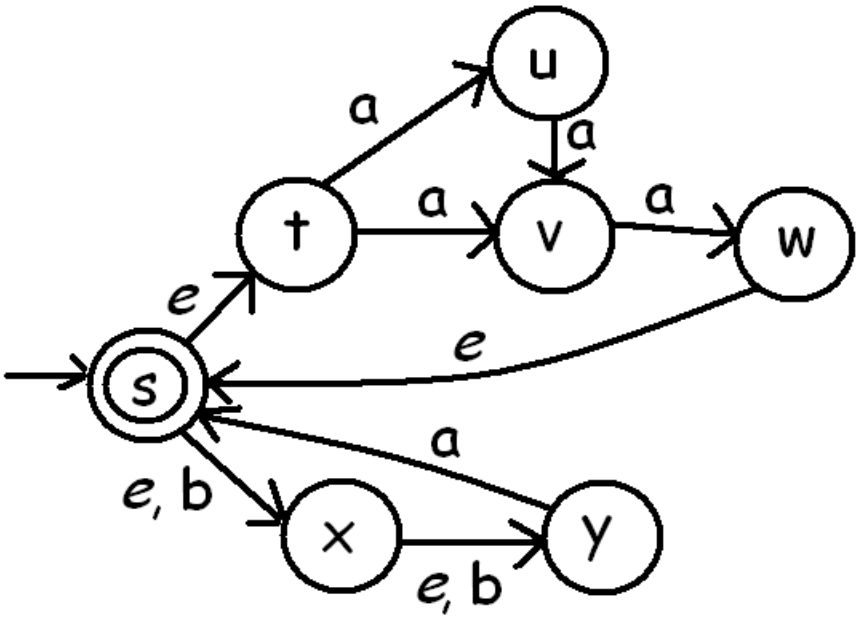
L_3 = a (ab)* a $\cup$ ab (a $\cup$ b)* a

Announcements

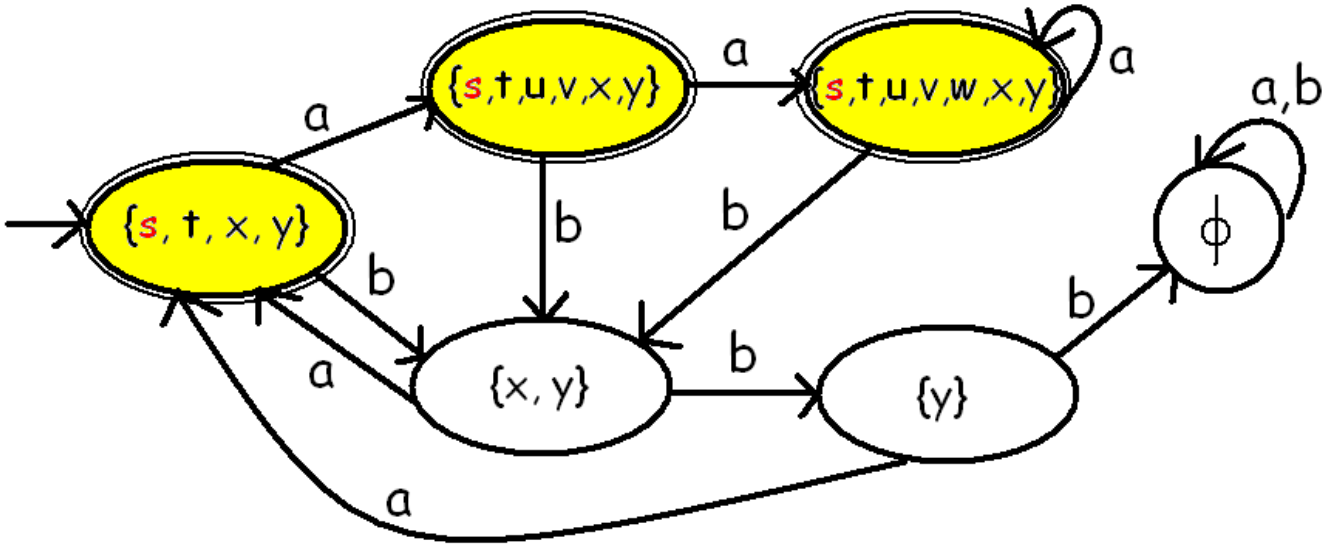
Assignment #2 is posted: Due Fri. June 8.

No tutorial today.

Have you tried the regular expression/DFA tutorials?



CSC 320 Lecture 9: Converting NDFA's to DFA's



Two machines M_1 and M_2 are equivalent if $L(M_1) = L(M_2)$.

Theorem: For any NDFA, there exists an equivalent DFA.

Proof: By construction.

Proofs by construction are nice because they don't just tell us that an object exists- they also give us an algorithm for constructing the object.

$E(q)$ = { p: p is reachable from q by following only transitions on ε}.

Note: q is always in $E(q)$.

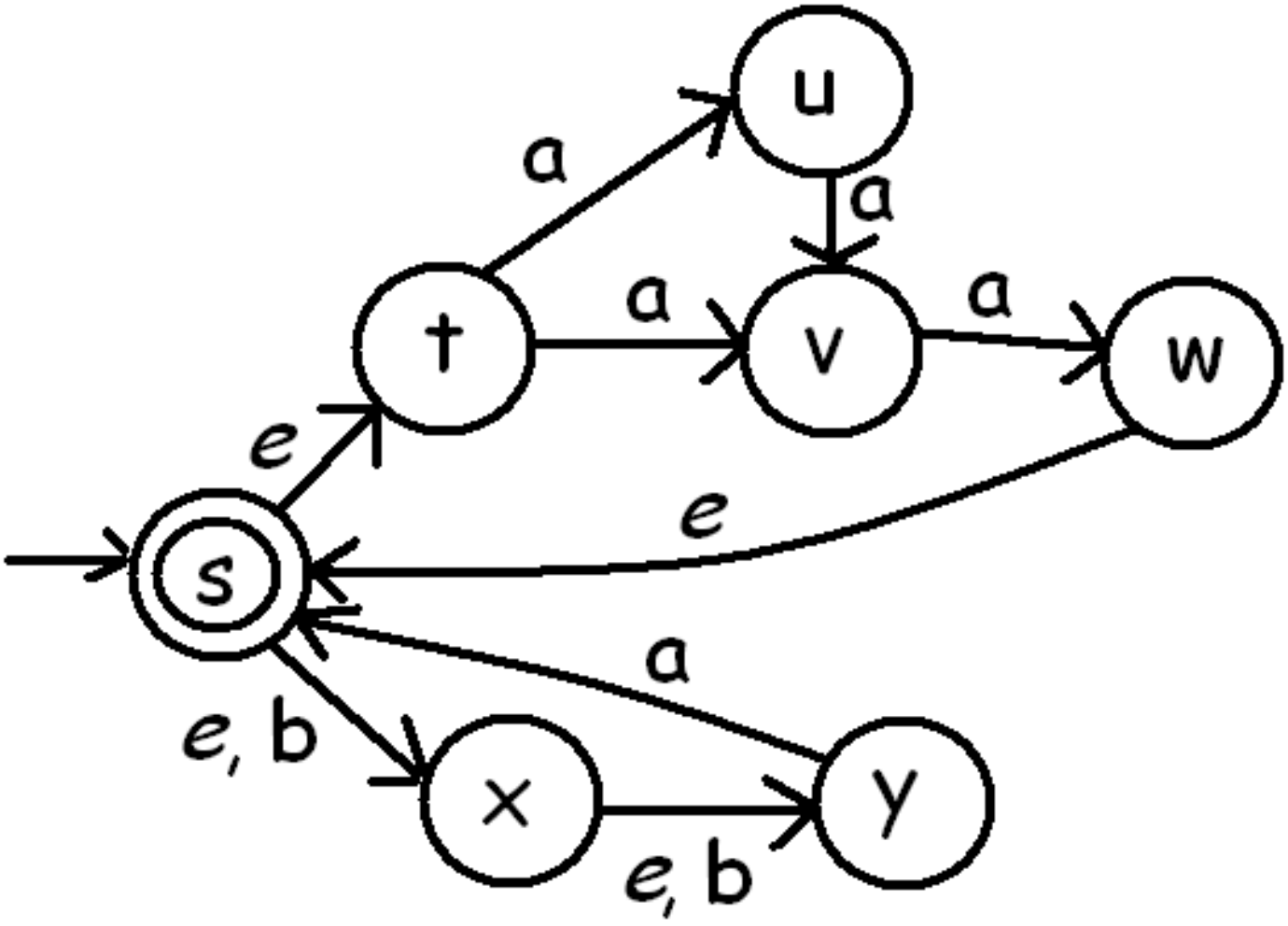
For a set S of states, $E(S) = U_{q \in S} E(q)$

Transition function for new DFA:

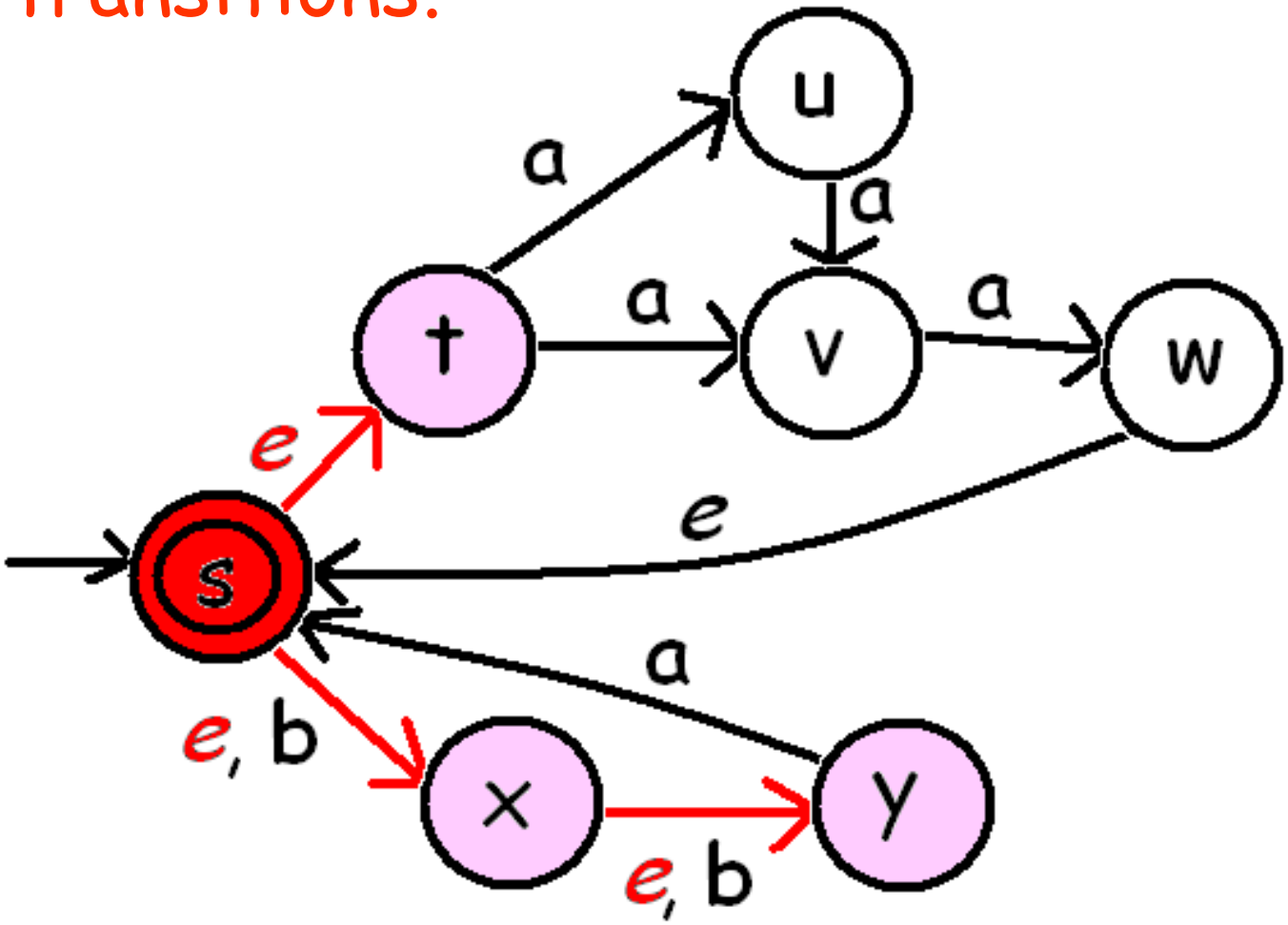
$\delta(P, \sigma) = E(Q)$ where

$Q = \{q:$ for some p in P, (p, σ, q) is in $\Delta\}$

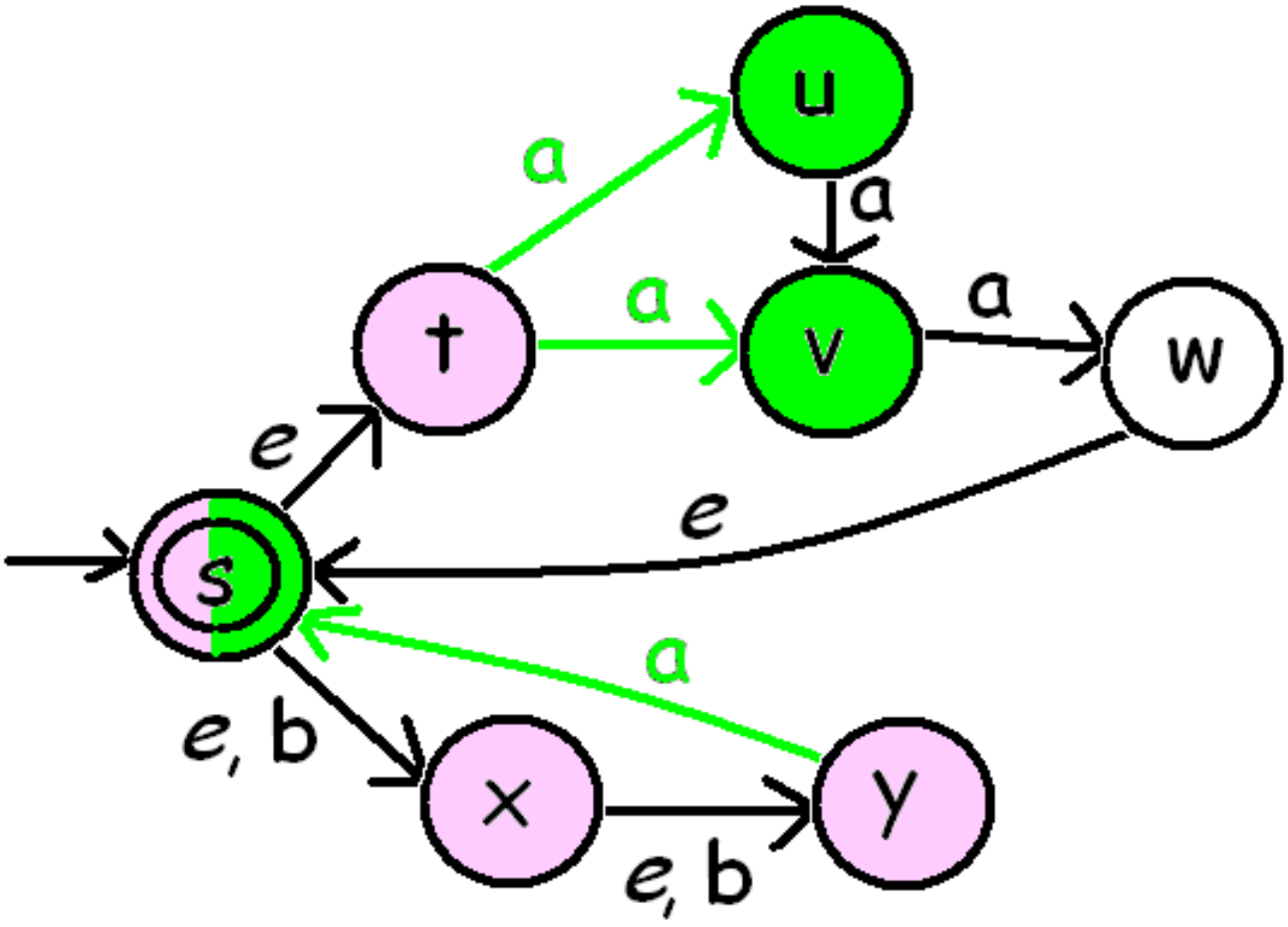
Convert this NDFA to a DFA:



Start state is {s, t, x, y} = states reachable from s by traversing 0 or more *e*-transitions.

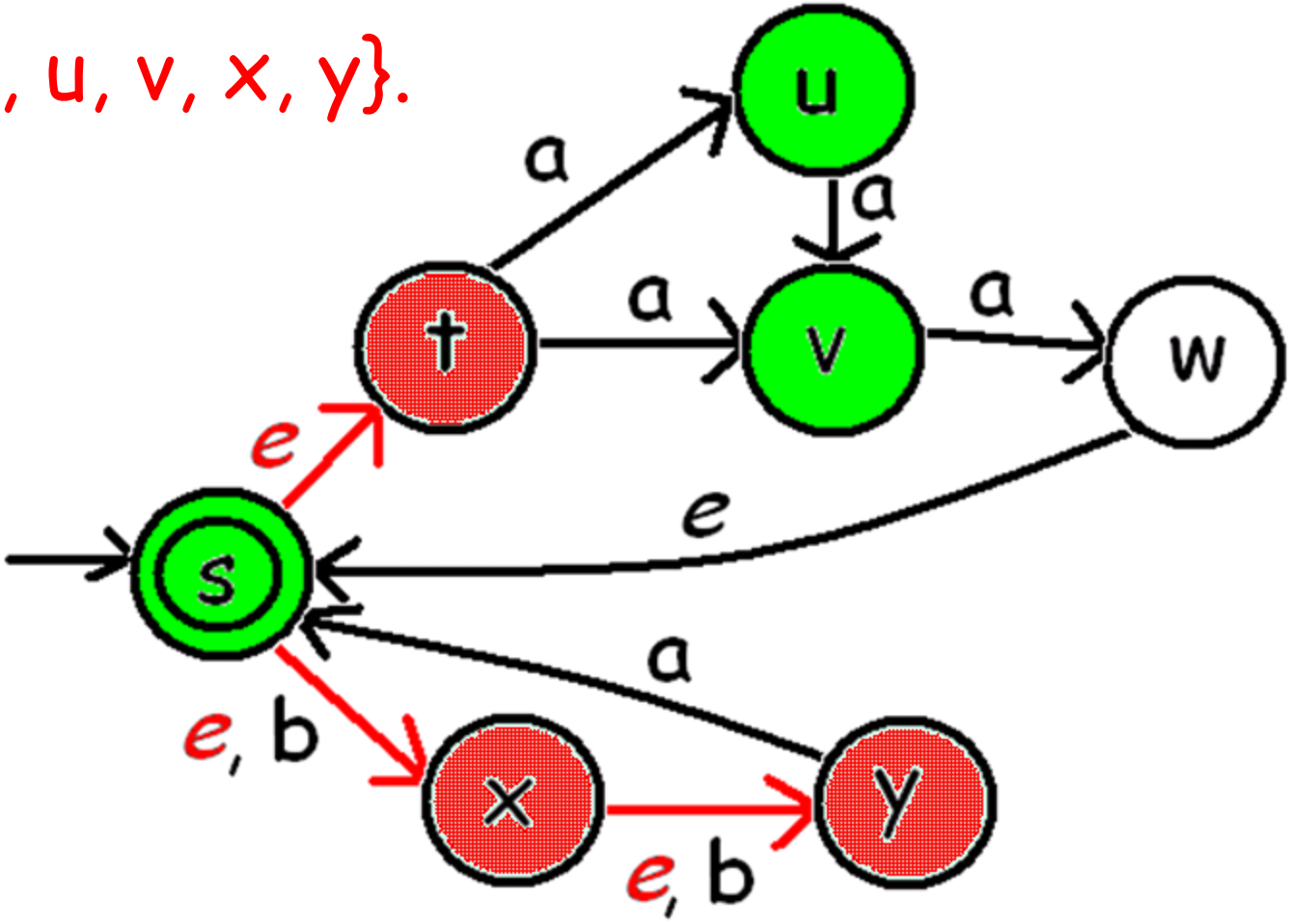


Read a from {s, t, x, y} and the next state can be {s, u, v}.

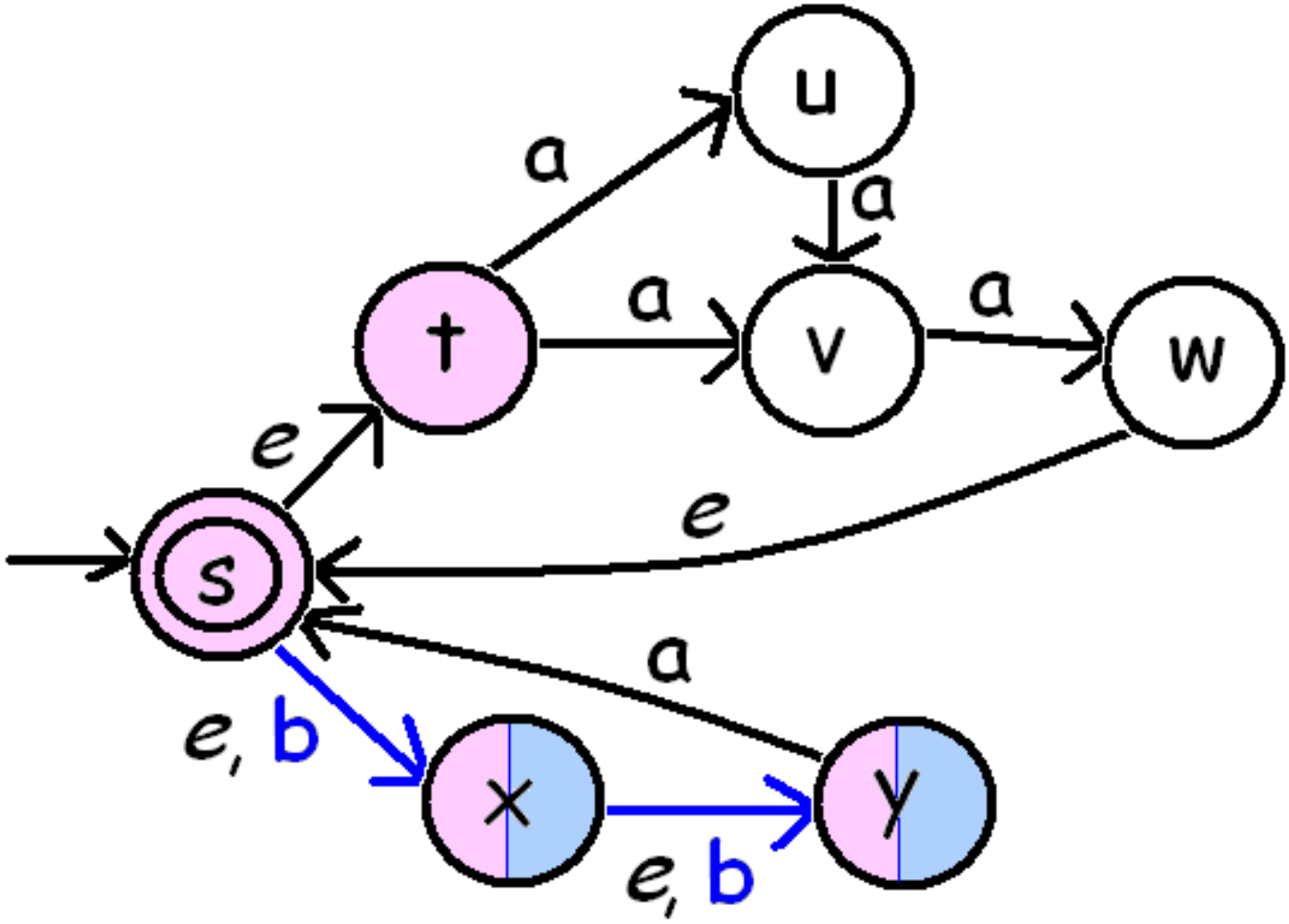


Then follow zero or more e-transitions from {s, u, v}, The next state is

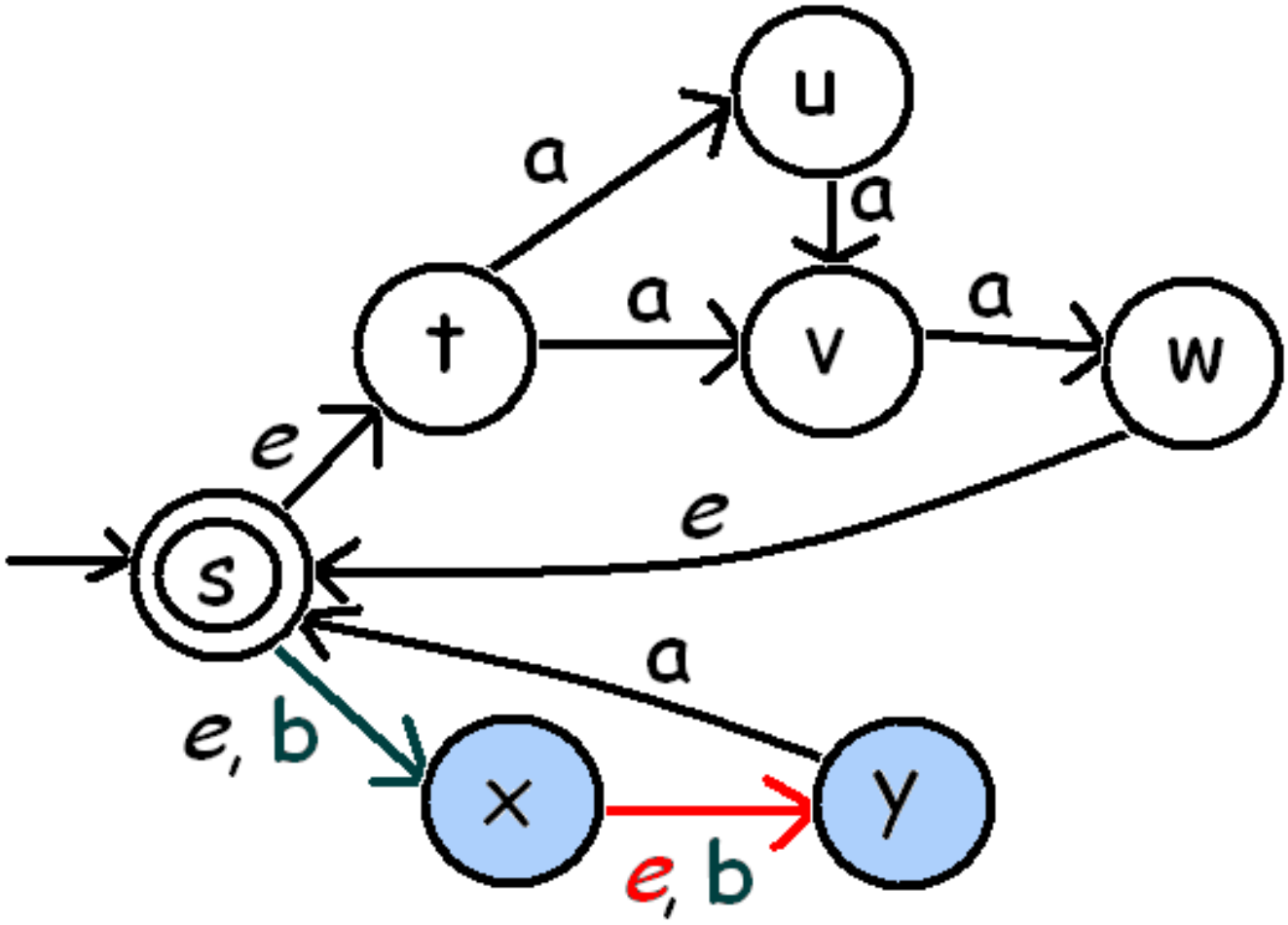
{s, t, u, v, x, y}.



Read b from {s, t, x, y} and the next state can be {x, y}.



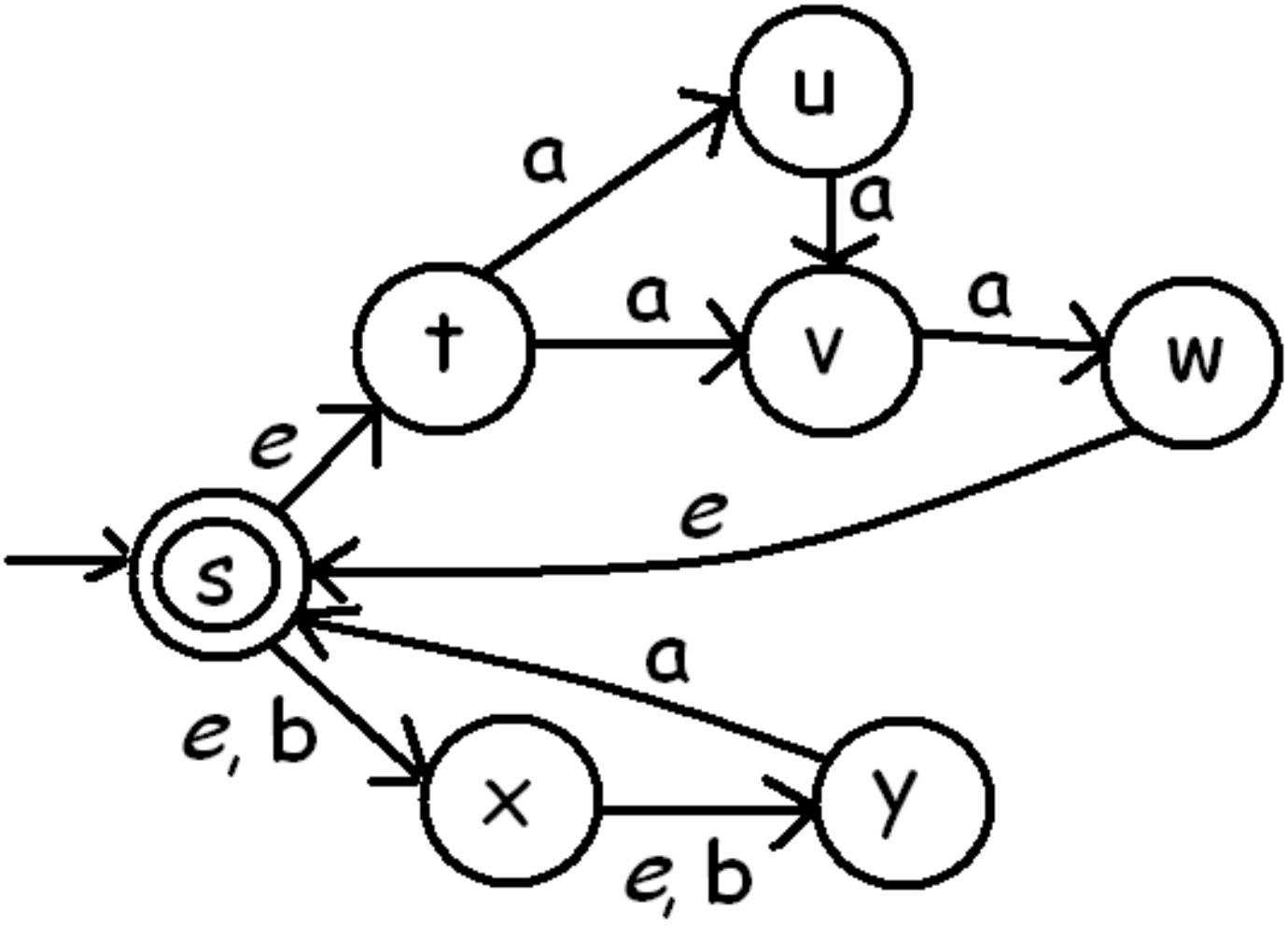
Then follow zero or more e-transitions from {x, y}, The next state is {x, y}.



The number of possible states could be exponential. But on assignments and exams, only a small subset of them will ever be pertinent.

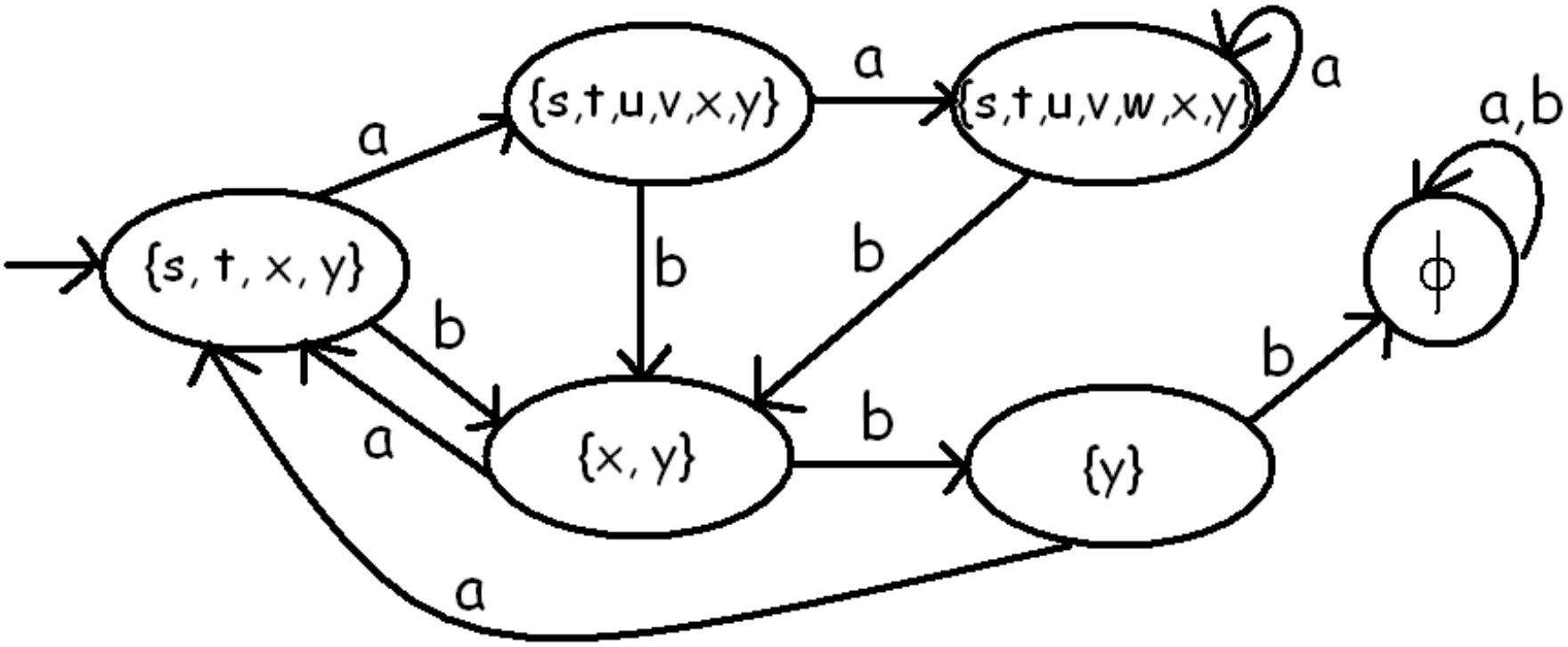
Only work out transitions for pertinent states.

Convert this NDFA to a DFA:



Which states should be final states?

Original machine: only final state was s.



Which states should be final states?

Answer: new states whose subsets contain a state which was a final state originally.