(b)

The DFA that accepts does not exist, the proof is the following:

Let ,Let

I will first prove that for , any DFA that accepts has at least states, not including the dead states. The proof is the following.

I will prove that for any 2 different prefixes of length , there is a string s over , the concatenation of these two prefixes with s will one be rejected one be accepted. We will prove this in 2 cases.

1.n is an even number. Then . Let x, y be any 2 different prefixes of length , let s=, then xs=x and |xs|=n, which is obviously accepted, while ys=y is rejected since , hence ys is not reversible. Hence the concatenation of these two prefixes with s are one rejected one accepted.

2. n is an odd number. Then . Let x, y be any 2 different prefixes of length , let s=, then xs=x and |xs|=| x, which is obviously accepted, while ys=y is rejected since , hence ys is not reversible. Hence the concatenation of these two prefixes with s are one rejected one accepted.

Hence we’ve proved that for any 2 different prefixes of length , there is a string s over , the concatenation of these two prefixes with s will one be rejected one be accepted. Hence the strings of these prefixes (since , hence the number of prefixes of length is ) are all end in different states as proved in (a), otherwise two of them end in the same states, for any string s over , the concatenation of those 2 with s will end in the same states which is a contradiction of what we proved before that any 2 different prefixes of length , there is a string s over , the concatenation of these two prefixes with s will one be rejected one be accepted.

Since the strings of these prefixes are all end in different states, and none of them are dead state since all of these prefixes can be leaded into a string of by concatenate with a string s over as showed in the prove above, hence there must be at least states, not including the dead states.

Hence we’ve proved that for , any DFA that accepts has at least states, not including the dead states.