

CMSC330 Spring 2012 Quiz #2 Solution

1. (4 pts) Ruby

Ruby has two classes Array and Hash that are similar but different in important ways. Both are frequently used to store a collection of data, and answer queries on the data (e.g., whether item x is present in the collection). Consider the difference between the following usages of Array and Hash in Ruby.

Given $a[x] = y$ // if a is an array, x is the *index*, y is the *element*
 // if a is a hash, x is the *key*, and y is the *value*

The method $\text{include?}(x)$ is found in both the Array and Hash classes. For arrays, $\text{include?}(x)$ returns true if x is one of the elements of the array. For hashes $\text{include?}(x)$ returns if x is a key in the hash.

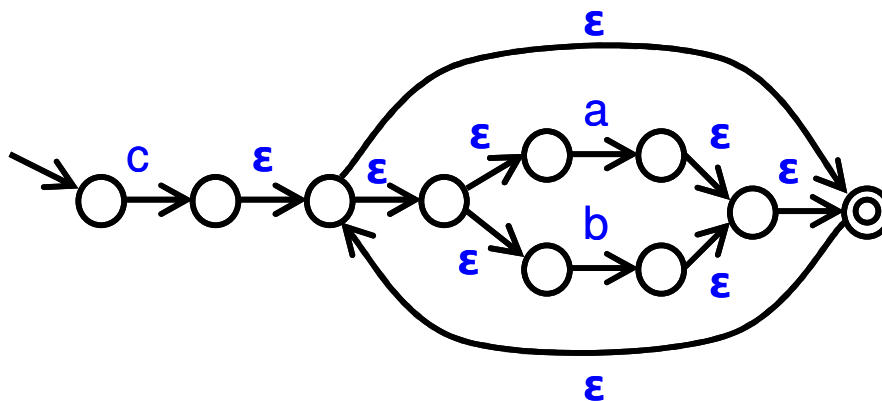
Consider the following code:

```
a[2] = 3
x = a.include?(2)
y = a.include?(3)
```

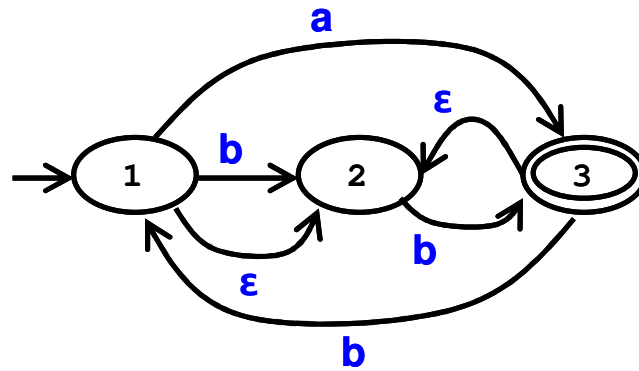
- (1 pt) If the code is preceded by the line $a = []$, what are the values of x & y ?
 $x = \text{false}$, $y = \text{true}$
- (1 pt) If the code is preceded by the line $a = \{ \}$, what are the values of x & y ?
 $x = \text{true}$, $y = \text{false}$
- (2 pt) What is a simple alternative to writing $a.\text{include?}(x)$ when “ a ” is a Hash? I.e., write code to test whether “ x ” is a key in Hash a without using “ $a.\text{include?}$ ”.
Use “ $\text{if } a[x] \neq \text{nil}$ ” instead of “ $a.\text{include?}(x)$ ”

2. (6 pts) RE to NFA

Create a NFA for $c(\text{alb})^*$, using the algorithm discussed in class.



(10 pts) Consider the following NFA.



- a. (2 pts) Does the NFA accept the string “bba”? If it accepts the string, list a sequence of state transitions (e.g., 1,2,3) that leads to acceptance of “bba”.

Yes. 1,2,3,1,3.

- b. (8 pts) Convert the NFA to a DFA using the subset construction algorithm discussed in class. Be sure to label each state in the DFA with the corresponding state(s) in the NFA.

