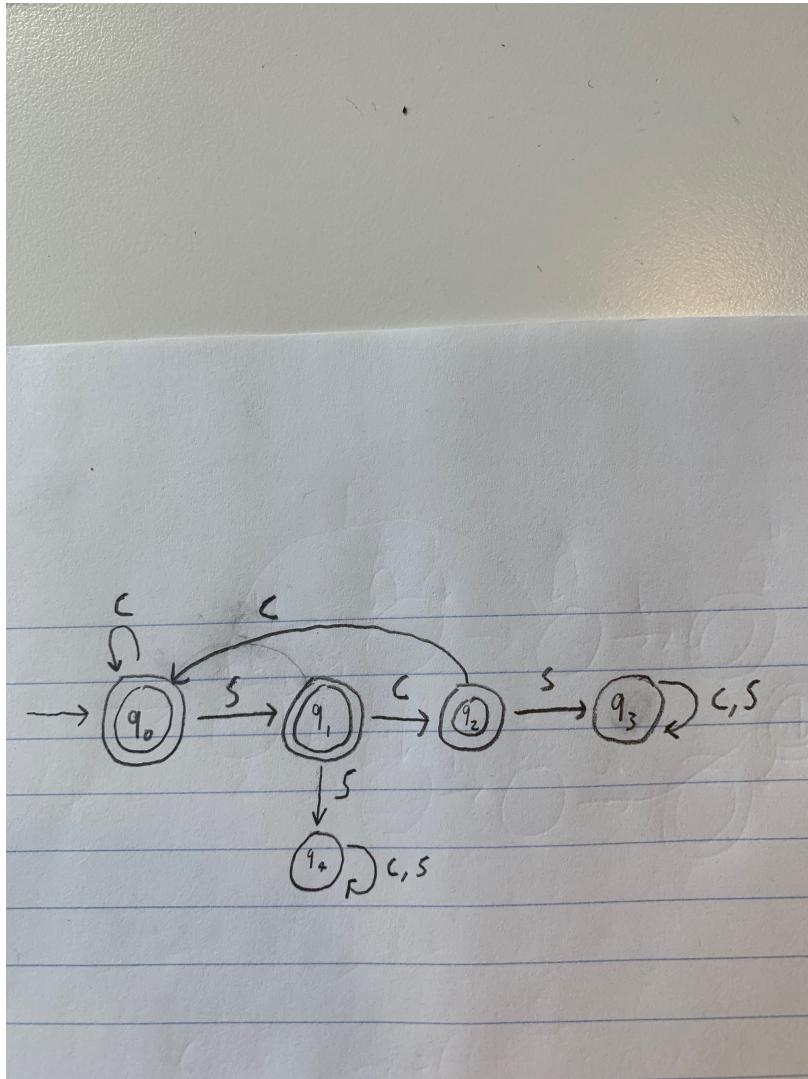


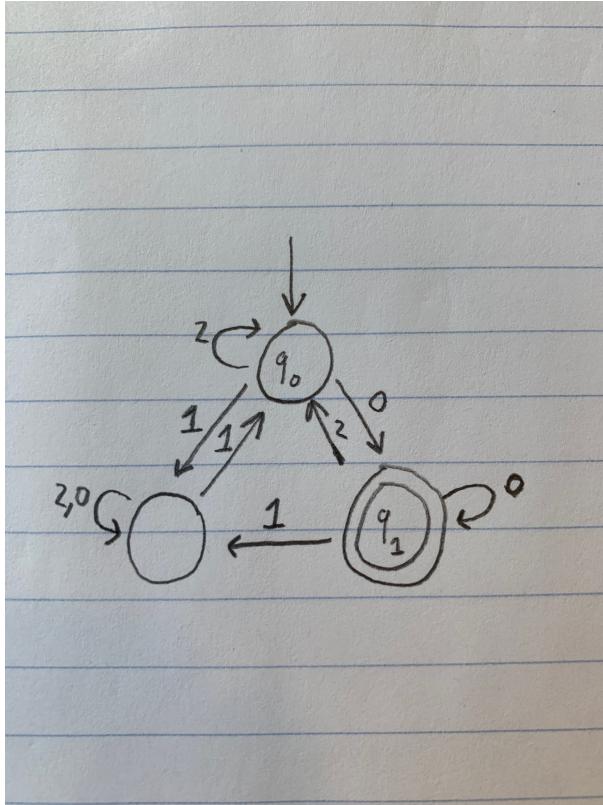
1. A.



This will work as we can have repeating Cs in q_0 when we have one S it will move us to q_1 . If we have another S we know the machine should reject and it does as it goes to q_4 and stays there until the end of the string. If instead we had SC we move to q_2 and if we have another S we move to q_3 where we become stuck similar to q_4 . If instead we had SCC we would move from q_2 to q_0 as this string should accept. Where we start the process again. $q_0, q_1, 2$ are all accept states as they will never have more than two S's as shown above. (Note, q_4 and q_3 could be combined to reduce total states down to 4)

B.

(The unmarked state is q2)



First I thought, every number divisible by 6 is also divisible by 2 and 3. While looking at numbers in base-3 I noticed a few tendencies:

- Every number divisible by 6 ends in a 0
- With even numbers in base-3 adding the numbers in base-10 will sum to an even number

Therefore I need three states.

- A state for when the sum of the numbers is odd
- A state for when the sum of the numbers is even but the last number is not 0
- A state for when the numbers sum to an even number and the last number is 0

The transitions arrows move you from you from state to state depending on if the sum were to flip from even or odd or stay constant and if the last number becomes a 0.

If at q_0

- adding two, results in an even sum but not ending in 0. The machine at q_0
- Add a 0 will move you to q_1 as you are now even and ending in a 0
- adding a 1 will move you to q_2 as the sum is now odd

If at q_1

- adding a 0 will result in no change as 0 is even and results in an ending of 0
- adding a 1 will result in the sum being odd which changes states to q_2
- adding a 2 will result in even but not ending in 0 so move to q_0

If at q_2

- adding a 0 will result in no change as it is still an odd sum
- adding a 1 will result in the sum being even moving you to q_0
- adding a 2 will result in no change as it is still an odd sum

Since number divisible by 6 should follow the two properties that I observed this machine will accept numbers divisible by 6 and only 6