

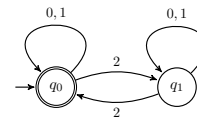


# Foundations of Computing I

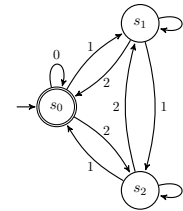
\* All slides are a combined effort between previous instructors of the course

## Strings over $\{0, 1, 2\}^*$

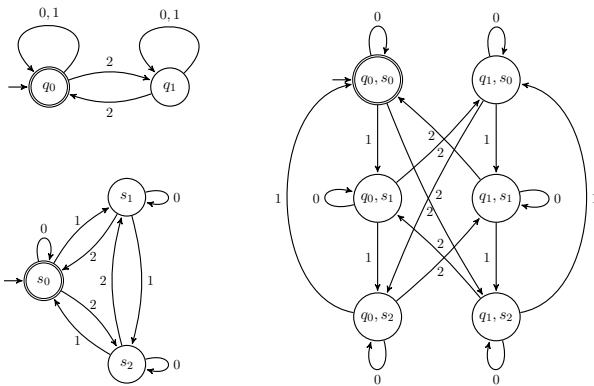
**$M_1$ : Strings with an even number of 2's**



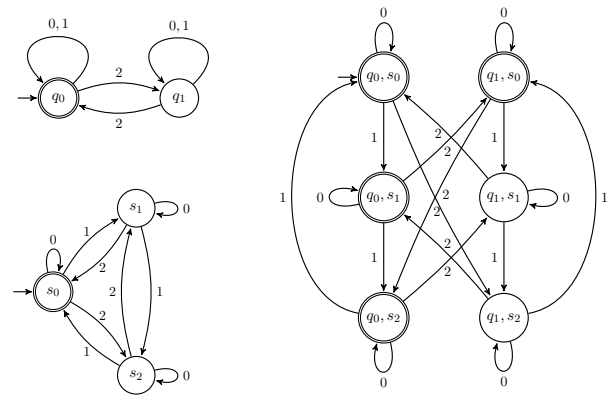
**$M_2$ : Strings where the sum of digits mod 3 is 0**



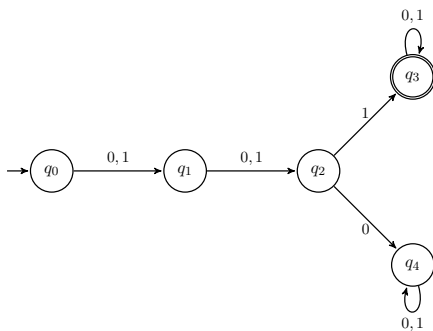
## Strings with an even number of 2's AND a mod 3 sum of 0



## Strings with an even number of 2's OR a mod 3 sum of 0

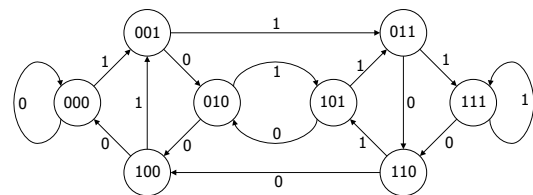


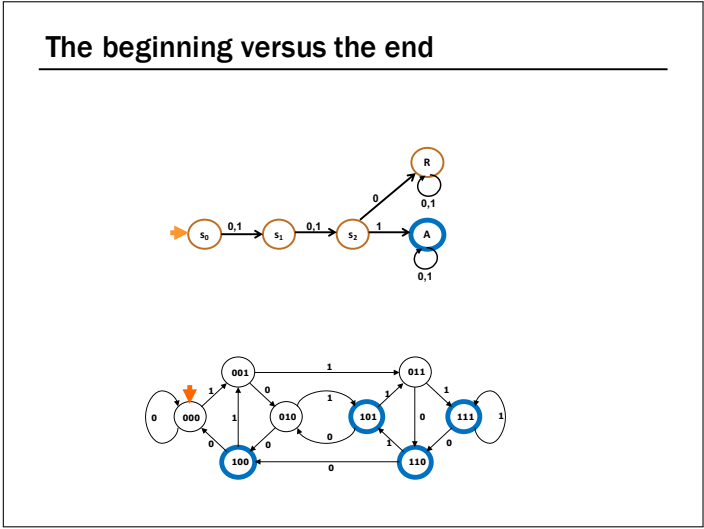
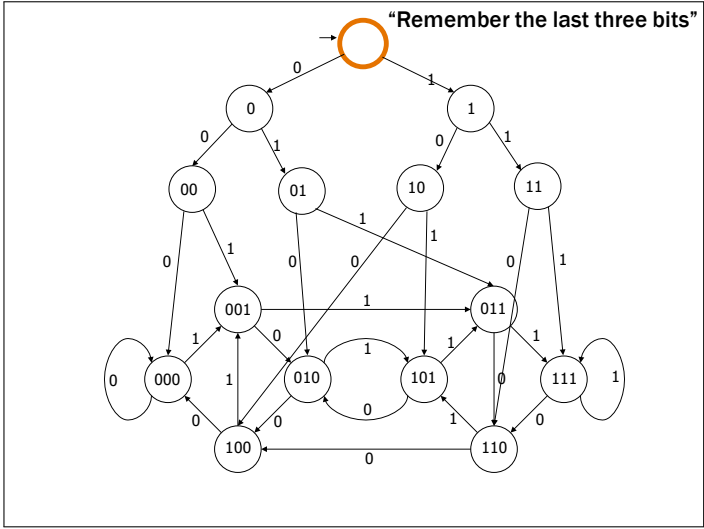
## FSM that accepts binary strings with a 1 three positions from the start



## 3 bit shift register

"Remember the last three bits"





## CSE 311: Foundations of Computing

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### Lecture 22: Finite State Machines with Output

### State Machines with Output

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"Tug-of-war"

State	Input		Output
	L	R	
$s_1$	$s_1$	$s_2$	Beep
$s_2$	$s_1$	$s_3$	
$s_3$	$s_2$	$s_4$	
$s_4$	$s_3$	$s_4$	Beep

## Vending Machine

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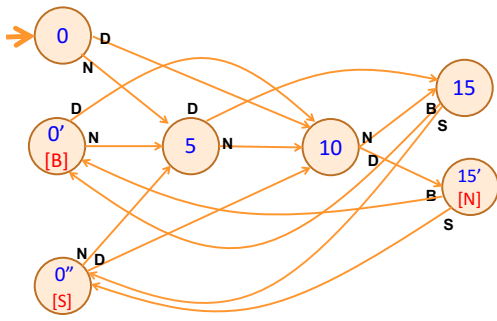
Enter 15 cents in dimes or nickels  
Press S or B for a candy bar

### Vending Machine, v0.1

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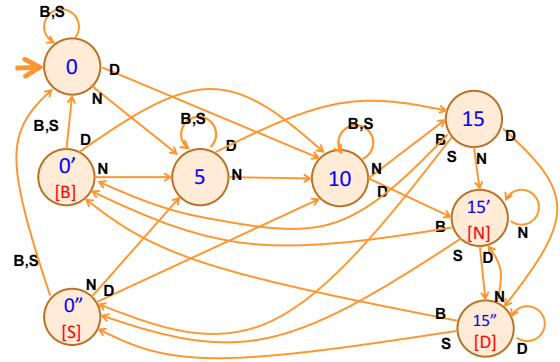
Basic transitions on N (nickel), D (dime), B (butterfinger), S (snickers)

## Vending Machine, v0.2



Adding output to states: N – Nickel, S – Snickers, B – Butterfinger

## Vending Machine, v1.0



Adding additional "unexpected" transitions