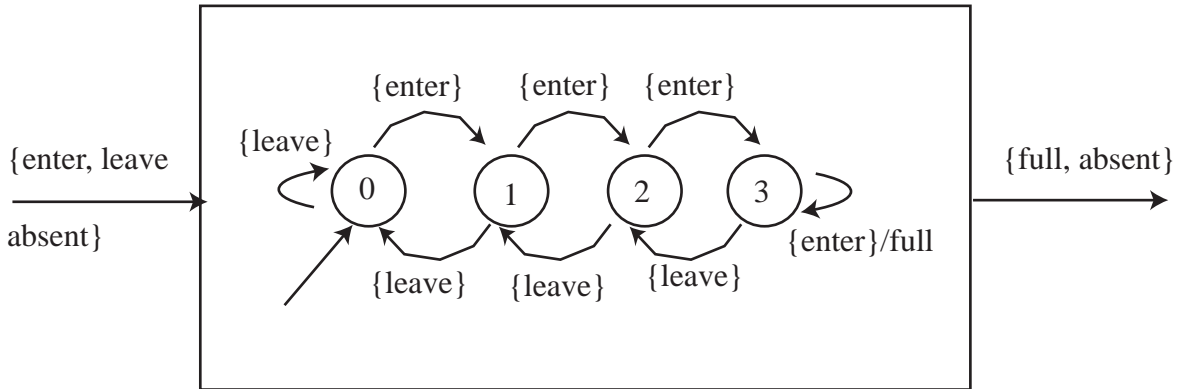


## EECS20n, Quiz 2, 9/21/04, Solution

1. **4 points** A parking lot has 3 spaces. At its entrance is a sensor that emits *enter* when a car enters the lot, and *leave* when a car departs. Design a state machine that takes as its input the sensor signal and outputs *full* when all 3 spaces are occupied, otherwise it outputs *absent*. Specify the state machine as a transition diagram inside the box in the figure below.

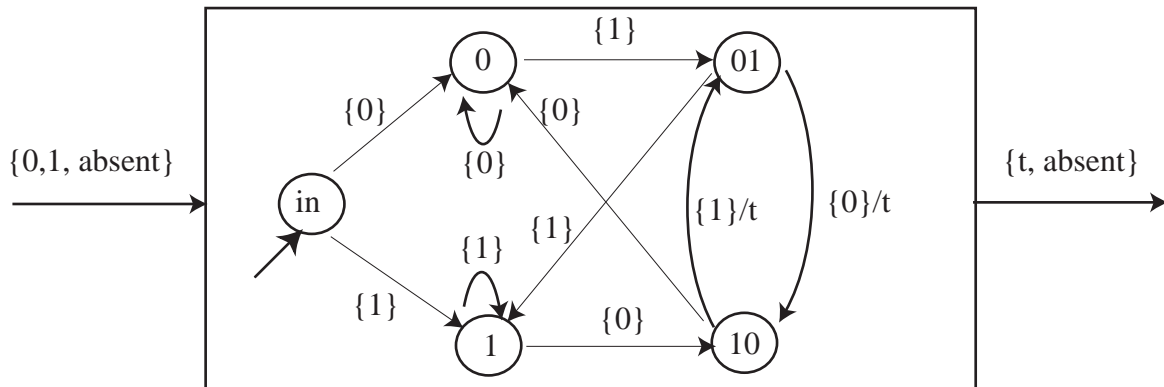


2. **6 points**

Design a state machine  $S$  with  $Inputs = \{0, 1, absent\}$ ,  $Outputs = \{T, absent\}$ , which recognizes the patterns 010, 101, i.e.

$$\forall x, \forall n, S(x)(n) = \begin{cases} t, & \text{if } (x(n-2), x(n-1), x(n)) = 010 \text{ or } 101, \\ absent, & \text{else} \end{cases}$$

Specify your state machine as a transition diagram in the box below.



If the input sequence is  $x = (0, 1, 0, 1, 0, 1, \dots)$ , what are the first six symbols in the output sequence  $y = \boxed{absent, absent, t, t, t, t, \dots}$ ?