BITS Pilani
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CS/IS F214
Logic in Computer Science

MODULE: TEMPORAL LOGICS

State Machines

State Machine - Example 1

- Problem:
  - *Compute **x mod 3** where **x** is represented as binary string.*

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  1. Initialize (current) remainder, **rem**, to 0.
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  3. Update **rem** based on **b**:
     1. …
  4. Drop the MSB from **x**
  5. Repeat steps 2 to 4 until **x** is empty.

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  1. Initialize (current) remainder, **rem**, to 0.
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  3. Update **rem** based on **b**:
     a) let **temp = 2*rem + b;**
     b) if **temp < 3** then **rem = temp;**
     c) else **rem = temp – 3;**
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Process for x mod 3

1. Initialize **rem** to 0.
2. Let **b** be the MSB
3. Update **rem**:
   a) **temp = 2*rem + b;**
   b) if **temp < 3** then
      rem = temp;
      else **rem = temp – 3;**
4. Drop the MSB from **x**
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States and Transitions

Consider the possible values of **rem**: **0**, **1**, or **2**

i.e. **rem** can be in one of three states at any time (step).

A ***state*** essentially captures the values being computed (and remembered)

Then a step – referred to as a ***transition*** – takes computation from one state to another.

Example 1:
State Machine for the process to compute x mod 3

- Exercise: Draw the state machine for this process.

State Machines and Systems

- State Machine can capture the operation of a system (in general) where
  - a state denotes ***observables*** (of the system) at a point in time and
  - a transition denotes a *change of state*.

- Exercise:
  - *Draw the state machine for an IO operation in a disk*