Memoryless means that next state depends only on current state and that ~~when~~ ~~so~~ ~~the~~ ~~residence~~ time spent in a state does not have an effect on when state is changed

This has the limitation that ~~simple~~ Markov chains model processes with exponentially distributed service times. ~~The processes can be combined to form processes.~~ To model processes with other service ~~of~~ time distributions ~~it~~ we must have multiple states in the model for a state in system being modelled.

Response time of an M/M/1 system is

$$r = \frac{\frac{1}{\mu}}{1-\rho}$$

$\frac{1}{\mu}$ = average service time

ρ = utilisation

becomes unbounded as $\rho \to 1$. Small ~~bit~~ change in ρ near 1 causes large change in response time

interarrival time distribution E_2: