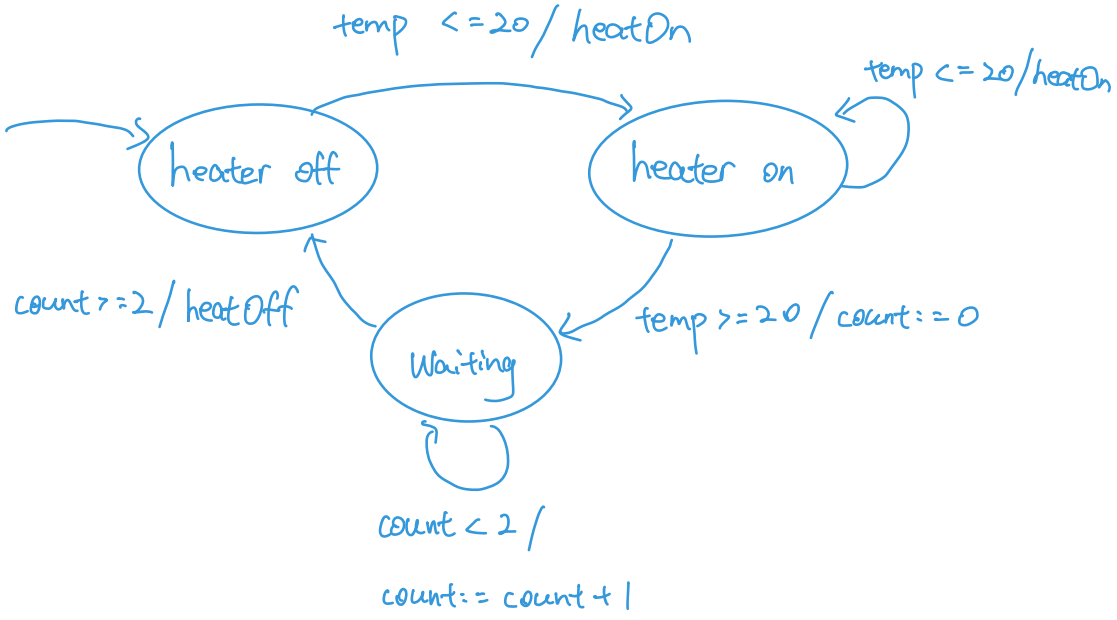
Chapter 3

Q2

(a)



(b) The FSM has three states. It can only have 2 states, including heater on and heater off.

(c) NO, it doesn't have time-scale invariance property.
The model is based on the fixed reaction time.
So if the time scale changes, the behavior will be different.

Q4.

All three states are reachable

Q5.

(a) States = {red, green, yello}

Inputs = ({tick} → {absent, present})

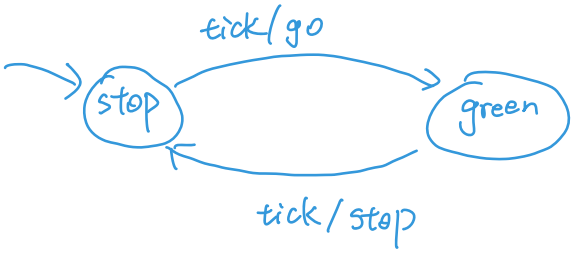
Outputs = ({go, stop} → {absent, present})

initial state = {red}

update =
- {(green, go)}, if s = red ∧ i(tick) = present
- {(yello, stop)}, if s = green ∧ i(tick) = present
- {(red, stop)}, if s = yellow ∧ i(tick) = present.
- {(s, absent)}, otherwise

(b)

(c)

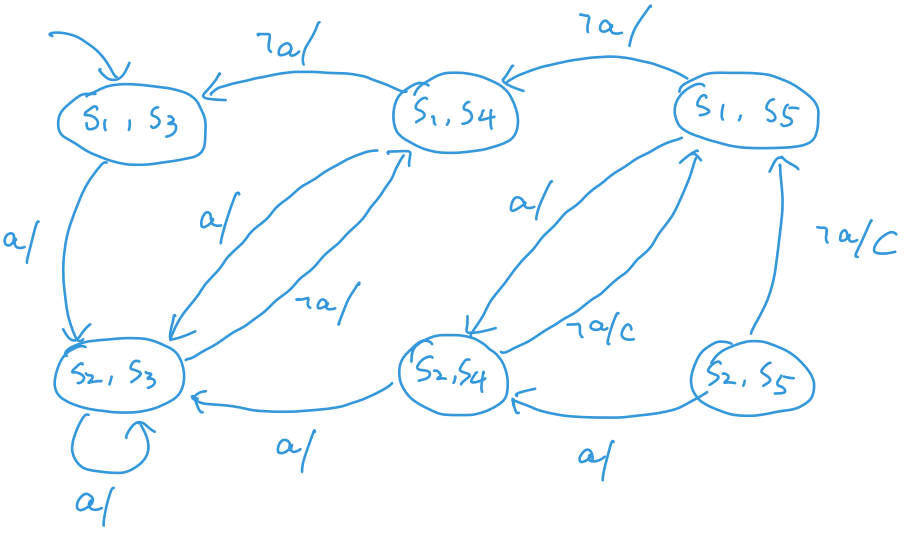


Since there is not multiple distinct transitions with guards that can evaluate to true in the same reaction, this state machine is deterministic.

stop $\xrightarrow{\text{tick/go}}$ green $\xrightarrow{\text{tick/stop}}$ stop $\xrightarrow{\text{tick/go}}$ green

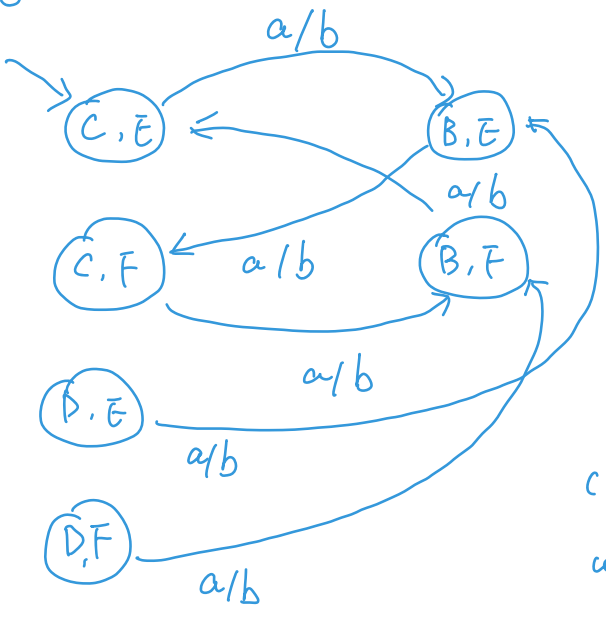
Chapter 5

Q 3.



(S_1, S_5), (S_2, S_4), (S_2, S_5) are not unreachable.

Q5.



(D,E), (D,F) are unreachable.

when input a is present, output b is present. Else, the input and output are both absent.

Simpler machine: