

\bigcirc = next
 \square = always

\diamond = eventually

Quiz 7

Exercise 1.

1. $\hat{r} = \{\text{red}\} \{\text{red/yellow}\} \{\text{green}\}$
2. $\hat{r} = \{\text{red/yellow}\} \{\text{green}\} \{\text{yellow}\} \{\text{red}\}$
3. $\hat{r} = \{\text{red}\} \{\text{red/yellow}\} \{\text{green}\} \{\text{yellow}\} \{\text{red}\} \{\text{red/yellow}\} \dots$
4. No, because there is no end state

Exercise 2.

1. "All lights can never be on at the same time"

$$(1) P = \{A_0 A_1 A_2 \dots \in (2^{AP})^\omega \mid \forall i \geq 0. \neg (\text{red} \in A_i \wedge \text{green} \in A_i \wedge \text{yellow} \in A_i)\}$$

$$(2) \square \neg (\text{red} \wedge \text{green} \wedge \text{yellow})$$

2. "The traffic light is green infinitely often"

$$(1) P = \{A_0 A_1 A_2 \dots \in (2^{AP})^\omega \mid \forall i \geq 0. \text{green} \in A_i\}$$

$$(2) \square \diamond \text{green}$$

3. "Once red, the light cannot become green immediately"

$$(1) P = \{A_0 A_1 A_2 \dots \in (2^{AP})^\omega \mid \forall i \geq 0. \text{red} \in A_i \Rightarrow \text{green} \notin A_{i+1}\}$$

$$(2) \square (\text{red} \Rightarrow \neg \bigcirc \text{green})$$

4. "Once red, the light always becomes green eventually"

$$(1) P = \{A_0 A_1 A_2 \dots \in (2^{AP})^\omega \mid \forall i \geq 0. \text{red} \in A_i \Rightarrow \exists j > i. \text{green} \in A_j\}$$

$$(2) \square (\text{red} \Rightarrow \diamond \text{green})$$

5. "Once red, it has a phase of red, then a phase of yellow, then a phase of green, then a phase of red, and so on"

$$(1) P = \{A_0 A_1 A_2 A_3 \dots \in (2^{+p})^{\omega} \mid$$

$$\forall i \geq 0, \text{red} \in A_i \wedge \text{yellow} \in A_{i+1} \wedge \dots \wedge \text{green} \in A_{i+2} \wedge \text{red} \in A_{i+3} \}$$

$$(2) \square (\text{red} \circ \text{yellow} \circ \text{green})$$

I pledge my honor that I have abided by
the Stevens Honor System.

Brian Patton