

EXTENDS *Reals, Integers*

VARIABLES *p*, The probability we are here
 state, The current state
 flip The current flip

vars $\triangleq \langle p, state, flip \rangle$

Done $\triangleq \{ "1", "2", "3", "4", "5", "6" \}$

Flip $\triangleq \{ "H", "T" \}$

One $\triangleq 1$

Probability $\triangleq \{ x \in Real : 0 \leq x \wedge x \leq One \}$

Transition $\triangleq [s0 \mapsto [H \mapsto "s1", T \mapsto "s2"],$
 $s1 \mapsto [H \mapsto "s3", T \mapsto "s4"],$
 $s2 \mapsto [H \mapsto "s5", T \mapsto "s6"],$
 $s3 \mapsto [H \mapsto "s1", T \mapsto "1"],$
 $s4 \mapsto [H \mapsto "2", T \mapsto "3"],$
 $s5 \mapsto [H \mapsto "4", T \mapsto "5"],$
 $s6 \mapsto [H \mapsto "6", T \mapsto "s2"]]$

TossFairCoin $\triangleq \wedge flip' \in Flip$
 $\wedge p' = p/2$

Init $\triangleq \wedge state = "s0"$
 $\wedge p = One$
 $\wedge flip \in Flip$

Next $\triangleq \wedge state \notin Done$
 $\wedge state' = Transition[state][flip]$
 $\wedge TossFairCoin$

Spec $\triangleq Init \wedge \Box[Next]_{vars} \wedge WF_{vars}(Next)$

THEOREM *Converges* $\triangleq \forall e \in Probability \setminus \{0\} : Spec \Rightarrow \Diamond(state \in Done \vee p < e)$