EXAMPLE Execute while true do skip under the SOS from an arbitrary state s.

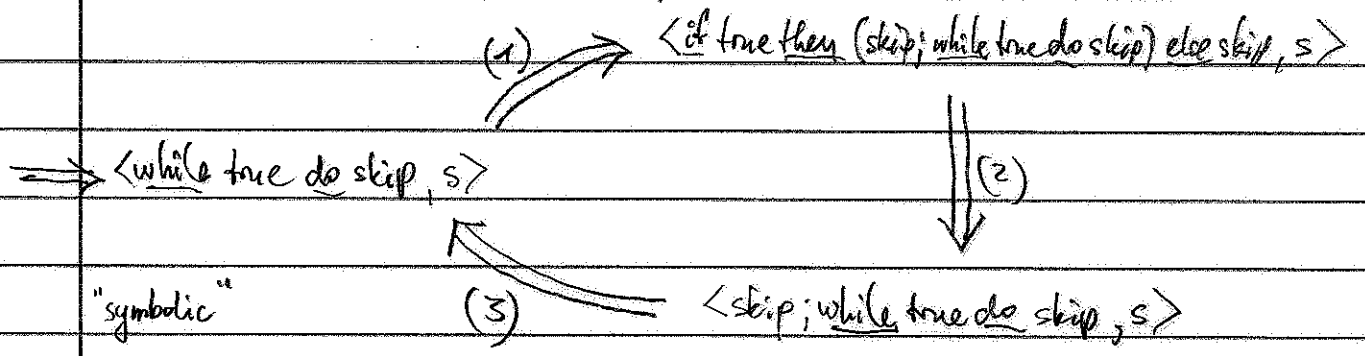
We have to derive all small-step transitions!

(1) $$\frac{}{\langle \underbrace{\texttt{while true do skip}}_{w}, s\rangle \Rightarrow \langle \texttt{if true then (skip; while true do skip) else skip}, s\rangle}\ \text{while}_{SOS}$$

(2) $$\frac{}{\langle \texttt{if true then (skip; while true do skip) else skip}, s\rangle \Rightarrow \langle \texttt{skip; while true do skip}, s\rangle}\ \text{if}^{t}_{SOS}$$

(3) $$\frac{\langle \texttt{skip}, s\rangle \rightarrow s}{\langle \texttt{skip; while true do skip}, s\rangle \Rightarrow \langle \texttt{while true do skip}, s\rangle}\ \text{comp}^{2}_{SOS}\quad \text{skip}_{SOS}$$

We have thus computed the following configuration graph (for s!)
(the same as a run/execution, but allows a finite repr. when exec. loops)



Forms the basis for state-space exploration based analyses!
→ especially useful for non-terminating, reactive programs
Note: transitions are still derived!