Cpt S 350 Homework #7 solutions

Please print your name!

Let G be color graph in the sense that it is a dorected graph where each node has a color. In particular, there is a designated initial node. An ω-path is an infinite walk on G that starts from the initial.

1. Design an algorithm that decides where there is an ω-path on which $\Box(\texttt{yellow} \vee \Diamond\texttt{blue})$ holds.

First, we need understand the formula. It says that on the ω-path, at each point, it is either yellow or there is a future point that it is blue. That is, this is equivalent to: (a). there is a blue, and after that, all yellow, or, (b). there are infinitely blue. To check (a), you need check init can reach a blue node, and from the blue node, after one edge, a looping SCC (either it has more than one node, or it has one node with self loop) can be reached, where the looping SCC is one that is the graph $\hat{G}$ after dropping all the non-yellow nodes from G. To check (b), you simply see if the init can reach a looping SCC in G that contains a blue node.

2. Design an algorithm that decides where there is an ω-path on which $\Box\Diamond(\texttt{yellow} \wedge \Diamond\texttt{blue})$ holds.

You need check that the init can reach a looping SCC in G that contains a blue node and a yellow node.