# Homework 5 (SPIN): COMS/CPRE/SE 412, COMS 512

Due-date: March 30 at 11:59PM (via Blackboard)

Homework must be individual's original work. Collaborations and discussions of any form with any students (except our TA) or other faculty members are not allowed. If you have any questions/doubts/concerns, post your questions/doubts/concerns on Piazza and/or ask our TA or me.

---

1. Two sets of frogs are in deep trouble.
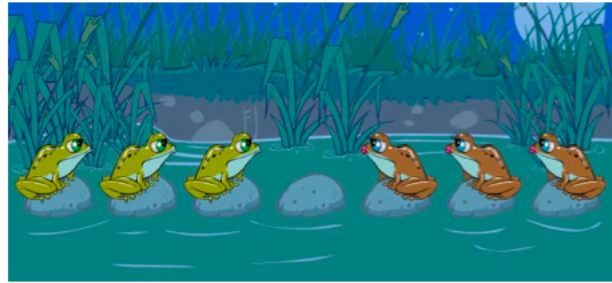
   (a) For whatever reason, none of the frogs want to turn back. So they can only move forward.

   (b) Furthermore, they can either jump over one frog or can jump to the rock right in front of them.

   (c) Each rock can hold just one frog.

   (d) None of the frogs want to get wet.

   Given the above constraints, model the movements of the frogs in SPIN such that you can obtain the `plan` to send all the right-facing frogs to the right of all the left-facing frogs. You are given an outline of the SPIN model (frogcrossing-hw.pml) for this problem. You are required to use that outline for this question.

   Submit `frogcrossing-<yournetid>.pml`. Write the plan at the top of the submitted file as part of comments.

2. You are given the SPIN model for the specification (without hazards) of the load-balancing problem (Question 2) in Homework assignment 3 - `fuel-hw.pml`. Review the specification carefully and answer the following (rename the file to `fuel-<yournetid>.pml` and submit with your answers):

   (a) The LTL property (`GF runM`) $\Rightarrow$ (`GF safe`) is satisfied by any execution if and only if

   > The master distributer is executed infinitely often implies that the fuel level is normal infinitely often.

   Is the property satisfied by the system? If not, justify?

   (b) Does the following property hold for the system?

   > If the master distributer is executed infinitely often and the channel from the master to the controller is not lossy infinitely often, then the fuel level is normal infinitely often.

   If the property does not hold, explain why?

   (c) Does the following property hold for the system?

   > If the master distributer is responsive infinitely often and the channel from the master distributer to the controller is not lossy infinitely often then the fuel level is normal infinitely often.

If the property does not hold, explain why?

(d) Does the following property hold for the system?

If the master distributer is responsive infinitely often then the fuel level is normal infinitely often.

If the property does not hold, explain why?

(e) Does the controller process correctly captures the specification of the controller behavior as presented in the Q2 of Homework assignment 3? If not, correct the behavior by the changing the controller process (update the process description in the submitted file).