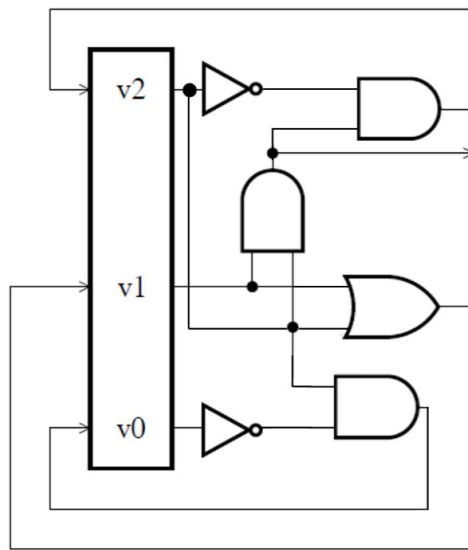


Model Checking (SS 2024) Homework 1

Deadline: **March 25, 2024, 9:00 am**

Submit your solution through TeachCenter

Consider the following synchronous circuit C . The initial value of the state variable v_0 of the circuit is `false`. The initial values of v_1 and v_2 are unknown.



Task 1. [30 points] State the formula S_0 that represents the set of initial states and the formula R that represents the transition relation of C .

Task 2. [30 points] Draw the Kripke structure $M = (S, S_0, R, AP, L)$ that represents C .

Task 3. [40 points] We want to use BMC to prove that v_0 is not always `false`.

3.1 Will BMC find a counterexample? If so, what is the smallest k such that BMC finds a counterexample. [10 point]

3.2 Write the BMC formula for $k = 2$. [15 points]

3.3 Is the formula satisfiable? Explain. [15 points]