Warm-Ups 04

This is a preview of the published version of the quiz

Started: Mar 4 at 12:53pm

Quiz Instructions

Please attend/watch Lecture 04 and optionally read the **Recommended Lecture Readings** (https://canvas.mit.edu/courses/25318/pages/g674e27f2325ea81816a4e6f5315ab335) , and then answer these questions.

Question 1 5 pts

Which of these statements are true about state machines?

- [ ] Every state much be reachable.
- [ ] There must be exactly one final state (i.e., a state with no outgoing transitions).
- [ ] A preserved state predicate can never transition from True to False.
- [ ] The Invariant Principle implies that any preserved state predicate is true in all reachable states.
- [ ] A preserved state predicate must be true at the start state.

Question 2 5 pts

Consider the state machine whose states are pairs (x, y), where x and y are natural numbers, whose start state is $(100, 100)$, and whose moves from an arbitrary state (x, y) are:

for any natural number

- $(x, y) \to (x - 1, y')$ for any natural number y' when $x > 0$, and
- $(x, y) \to (x, y - 1)$ when $y > 0$

Which of the following statements are true about this state machine?

- [ ] Only states (x, y) with both $x, y \leq 100$ are reachable.
- [ ] The only final state is $(0, 0)$.
- [ ] $x \leq 50$ is a preserved predicate
- [ ] $x \leq 50$ is true in all reachable states
- [ ] Every execution of this state machine terminates after at most 200 steps.

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6.1200J Mathematics for Computer Science

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