**CSCE 747 - Finite State Verification Activity  
Name(s):**

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| Temporal Operators: A quick reference list.   * G p: p holds globally at every state on the path * F p: p holds at some state on the path * X p: p holds at the next (second) state on the path * p U q: q holds at some state on the path and p holds at every state before the first state at which q holds. * A: for all paths from a state * E: for some path from a state |

Consider a finite state model of a traffic-light controller similar to the one discussed in the homework, with a pedestrian crossing and a button to request right-of-way to cross the road.

State variables:

* **traffic\_light: {RED, YELLOW, GREEN}**
* **pedestrian\_light: {WAIT, WALK, FLASH}**
* **button: {RESET, SET}**

Initially: **traffic\_light = RED, pedestrian\_light = WAIT, button = RESET**

Transitions:

pedestrian\_light:

* **WAIT → WALK if traffic\_light = RED**
* **WAIT → WAIT otherwise**
* **WALK → {WALK, FLASH}**
* **FLASH → {FLASH, WAIT}**

traffic\_light:

* **RED → GREEN if button = RESET**
* **RED → RED otherwise**
* **GREEN → {GREEN, YELLOW} if button = SET**
* **GREEN → GREEN otherwise**
* **YELLOW→ {YELLOW, RED}**

button:

* **SET → RESET if pedestrian\_light = WALK**
* **SET → SET otherwise**
* **RESET → {RESET, SET} if traffic\_light = GREEN**
* **RESET → RESET otherwise**

1. Briefly describe a safety-property (nothing “bad” ever happens) for this model and formulate it in CTL.
2. Briefly describe a liveness-property (something “good” eventually happens) for this model and formulate it in LTL.