1. **10 points** An electronic door lock works as follows. If a card is swiped across the card reader, the door will be unlocked for 20 seconds. The door is locked if a card has not been swiped during the previous 20 seconds.

i. **5 points** Give the transitions of the hybrid system so that it meets the specification above. Each transition must be in the form guard/output; action:

\[ \{(x(t), s(t)) \mid x(t) = \text{swipe}\}/\text{unlock}; s(t) := 20 \]

\[ \{(x(t), s(t)) \mid x(t) = \text{swipe}, s(t) = 0\}/\text{lock}; s(t) := 0 \]

\[ \{(x(t), s(t)) \mid x(t) = \text{swipe}\}/\text{absent}; s(t) := 20 \]

ii. **5 points** If as indicated a card is swiped at 10, 40, 50 seconds, plot the mode, trajectory s, and output y.

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(1) \(\{(x(t), s(t)) \mid x(t) = \text{swipe}\}/\text{unlock}; s(t) := 20\)

(2) \(\{(x(t), s(t)) \mid x(t) \not= \text{swipe}, s(t) = 0\}/\text{lock}; s(t) := 0\)

(3) \(\{(x(t), s(t)) \mid x(t) = \text{swipe}\}/\text{absent}; s(t) := 20\)