QUIZ 1, Section C

Design a finite state machine (FSM) to model the behavior of a simple ATM machine, The ATM should handle the following operations, a transaction could be canceled at any stage of processing. The ATM machine would be idle in the beginning:
1. Card Insertion
2. PIN Entry
3. Transaction Selection (Withdrawal, Balance Inquiry)
4. Transaction Processing
5. Card Ejection

---

1. Define the states of the ATM S,....Sn (5 Points)

S1: Idle
S2: Card Read
S3: PIN Verification

S4: Menu Display
S5: Processing Transaction
S6: Card Ejection

2. Define the events that trigger transitions between states. E1 ....Em (5 Points)

E1: Insert Card
E2: Enter PIN
E3: PIN Valid
E4: PIN Invalid

E5: Select Transaction
E6: Transaction Complete
E7: Cancel Transaction
E8: Card Removed

3. Specify the laws (transition rules) using predicate calculus for the Cancel event. (5 Points)

$$\forall s \in \{S2, S, 3S4, S5\} : (\ state(s) \wedge event(E7)\ ) \rightarrow state'(S6)$$

For all states s in the set $\{S2, S3, S4, S5\}$, if the current state is s and the event $E7$ (Cancel Transaction) occurs, then the next state will be $S6$ (Card Ejection).

4. Draw the state transition diagram. (5 Points)