**CS332 Mod02 HW3**

1. (10 pts) Let Σ = {a, b}. Draw the FSM, M, for L = (aba)\* + (bab)\*

Shape, circle

Description automatically generated

1. (6 pts) Represent M as the 5-tuple M = {Q, Σ, q0, F, δ }.

M = { Q , Σ , q0 , F , δ }

Q = { q0 , q1 , q2 , q3 , q4 , q5 , q6 , q7  }

|  |  |  |
| --- | --- | --- |
|  | a | b |
| 0 | 1 | 5 |
| 1 | 2 | 3 |
| 2 | 2 | 2 |
| 3 | 4 | 2 |
| 4 | 1 | 2 |
| 5 | 6 | 2 |
| 6 | 2 | 7 |
| 7 | 2 | 5 |

Σ = { a , b }

q0  = q0

F = { q0 , q4 , q7 }

δ =

1. (3 pts) List the states that are visited when the string u = abaaba is processed. Is the string accepted or rejected?

u 🡪 q0 , q1 , q3 , q4 , q1 , q3 , q4

The string is accepted.

1. (3 pts) List the state that are visited when the string v = baba is processed. Is the string accepted or rejected?

v 🡪 q0 , q5 , q6 , q7 , q2

The string is rejected.

1. (8 pts) There are four things wrong with the following 5-tuple for some machine, M. What are they?

|  |  |  |
| --- | --- | --- |
|  | a | b |
| 0 | 1 | 2 |
| 1 | 0 or 1 | 2 |
| 2 | 3 | 4 |
| 3 | 3 | 5 |
| 4 | 5 | n/a |
| 5 | 5 | 5 |

Q = { q0, q1, q2, q3, q4, q5 }

Σ = {a, b}

q0= q7

F =  q4

δ =

* q7 doesn’t exist in Q so the statement q0 = q7  must be an error.
* F = q4 is incorrect notation and should be F = { q4 }
* δ(b , q4) = “n/a” is not acceptable. It must produce an existing state. Every input must produce a valid output.
* δ(a , q1) = “0 or 1” is not acceptable as that implies it is a   
  non-deterministic situation. Every state must always have exactly ONE state for every possible input in the Σ.