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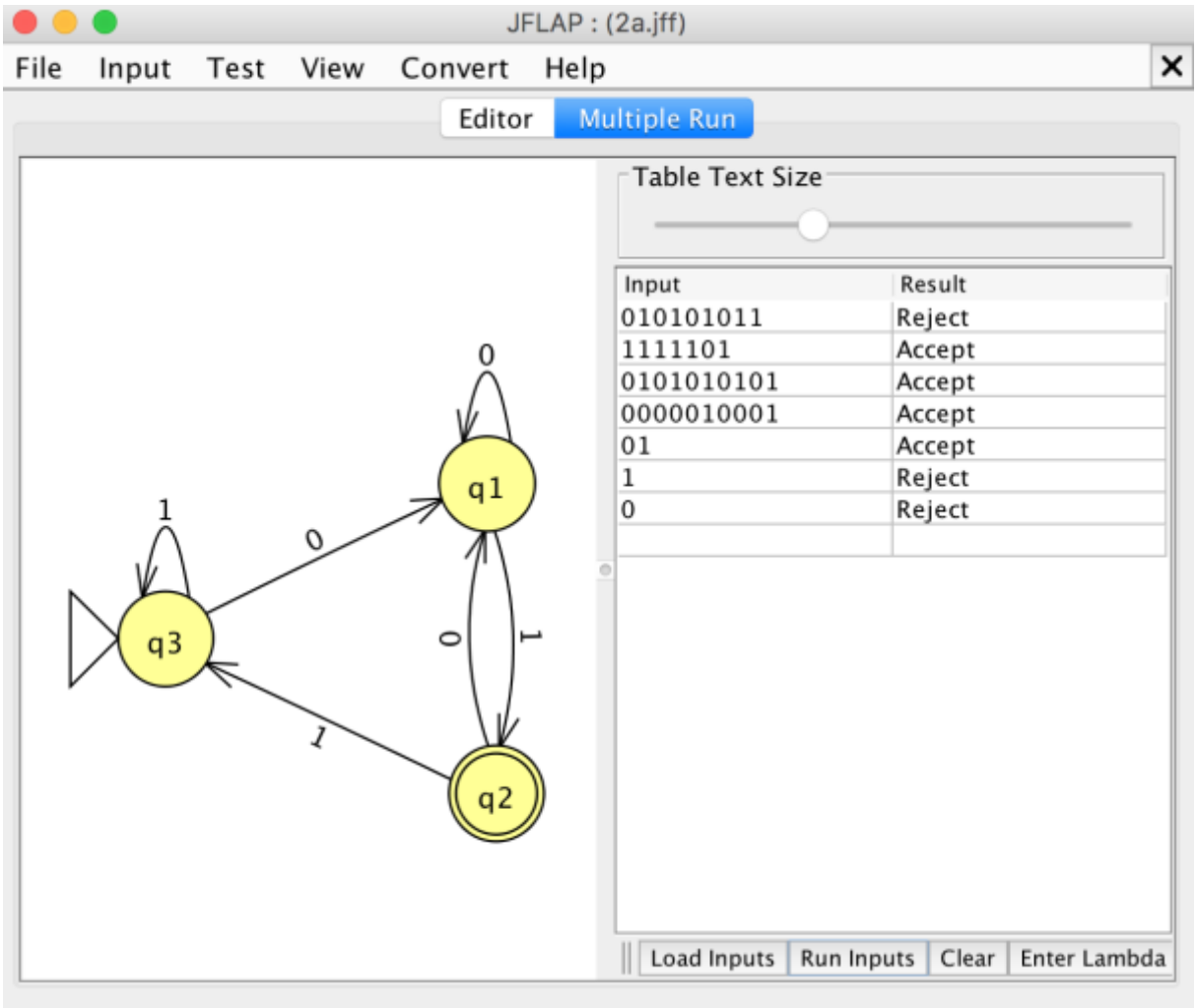
Konzepte konkreter und abstrakter Maschinen

Übungsblatt 1 20. Oktober 2016

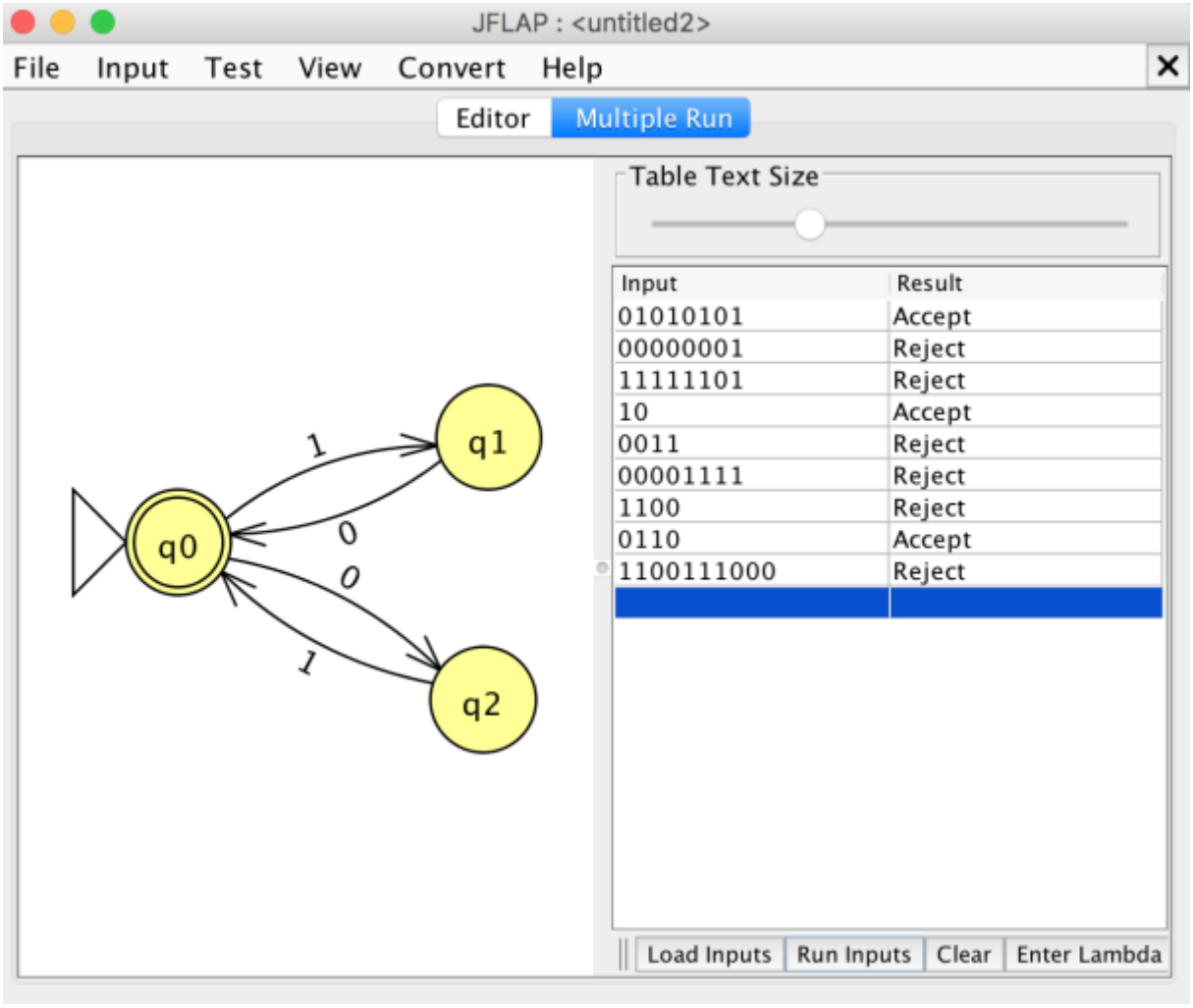
Aufgabe 1

Aufgabe 2

$$L_A = \{w01 \mid w \in V^*\}$$



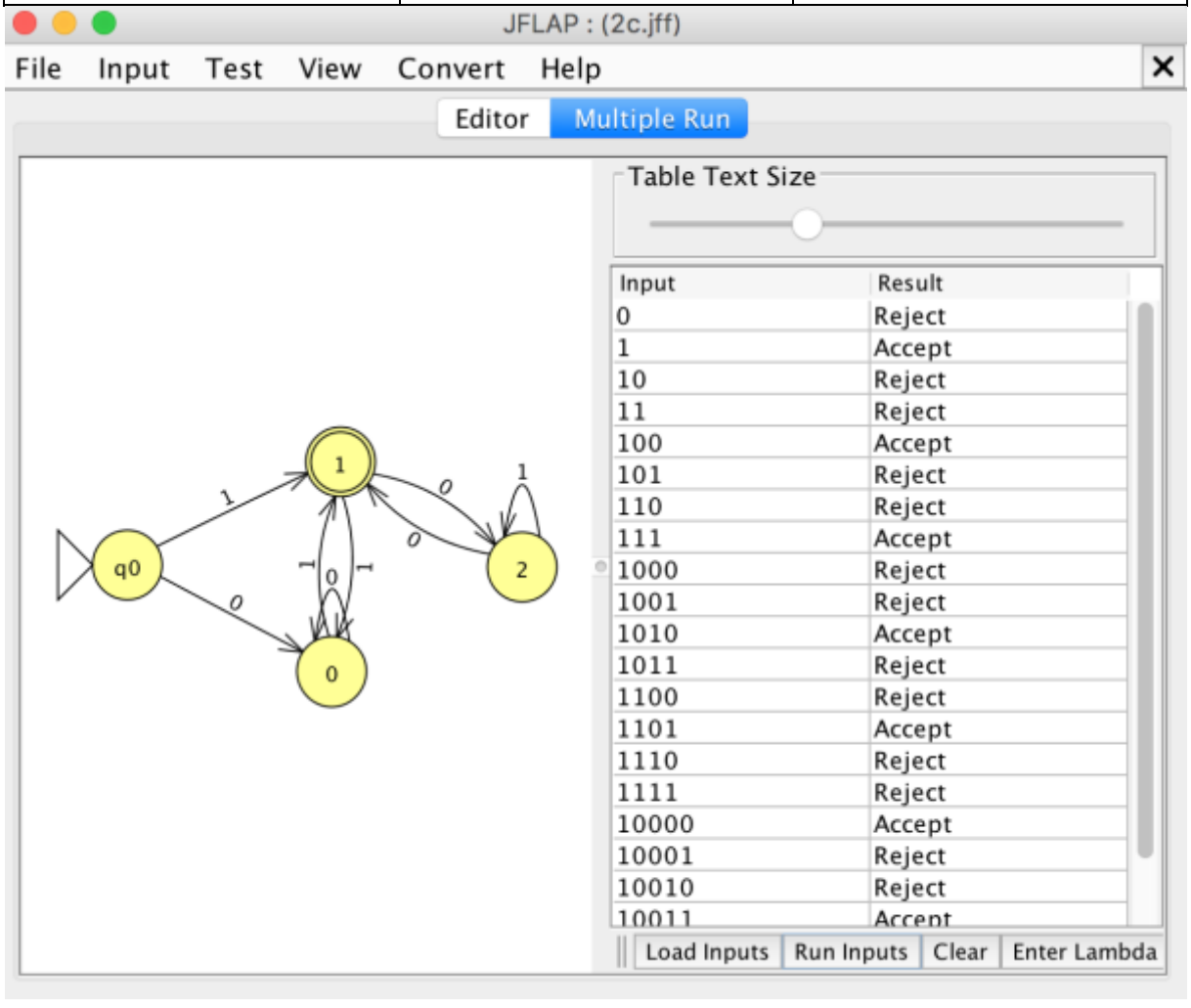
$L_B = \{w \mid w \in V^* \wedge \|w\|_0 = \|w\|_1\}$, wobei $\|w\|_x$ die Anzahl des Zeichens x im Wort w ist.



nicht möglich => Fälle 000000111111 nicht abbildbar als Automat, da kein Zähler vorhanden

$L_C = \{w \mid w \in V^* \wedge (\|w\|_{dez} \mod 3) = 1\}$, wobei $\|w\|_{dez}$ das dezimale Äquivalent des Wortes w ist, wenn dieses als Dualzahl interpetiert wird. und $\mod k$ der Rest bei Division durch k ist.

Dez.Wert	Bin.Wert	Mod 3
0	0000	0
1	0001	1
2	0010	2
3	0011	0
4	0100	1
5	0101	2
6	0110	0
7	0111	1
8	1000	2
9	1001	0
10	1010	1
11	1011	2
12	1100	0
13	1101	1
14	1110	2
15	1111	0



$$L_D = \{0^k 1^k \mid k \in \mathbb{N}\}$$

wie bei L_B fehlt hier ein Zähler, mit dem die Anzahl 0en oder 1en „überprüft“ werden kann

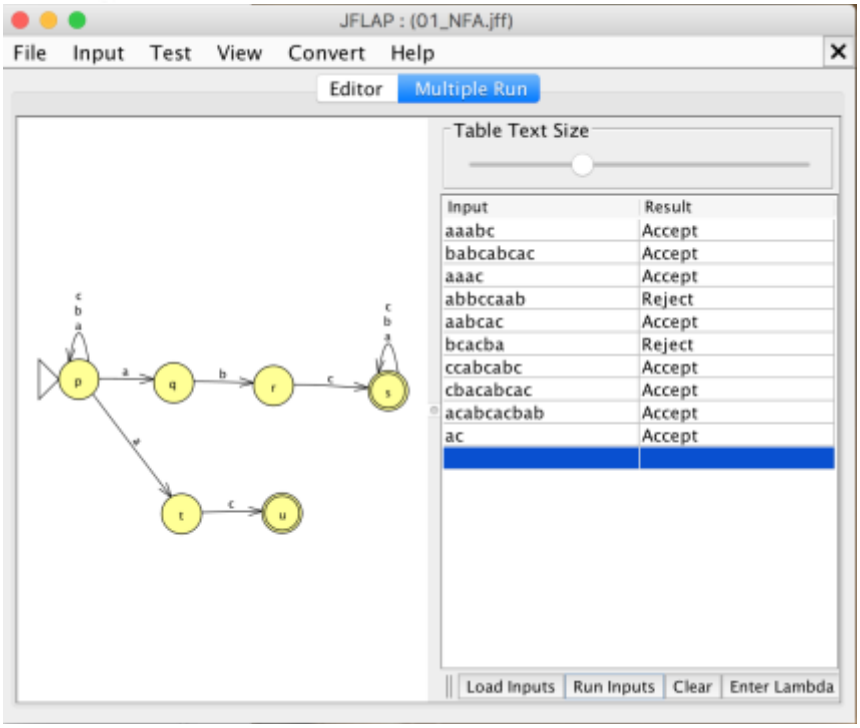
Aufgabe 3

Wurde das letzte Mal schon abgegeben, dafür dieses Mal zusätzliche Abgabe des DFA Moduls.

Modul

Question 1.

1. Load the NFA in the file NF-1.jflap.
2. Enter inputs w_1, w_2, w_3 and w_4 in the discussion above and verify that the first three inputs are accepted and the last is rejected, as shown in the diagram below.
3. List all configurations for the inputs w_1, w_2, w_3 and w_4.
4. Enter six more inputs of your own, three of which are accepted and the other three are rejected.

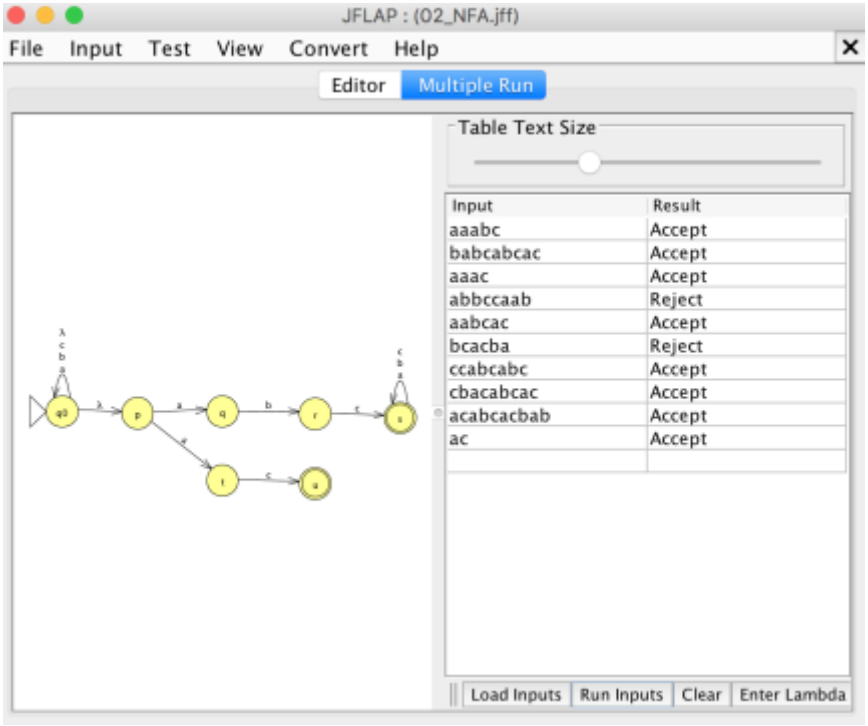


Question 2. Complete the table above by filling out all blank cells in the table. Explain your answers.

	a	b	c	λ
p	{p,q,t}	{p}	{p}	ϕ
q	ϕ	{r}	ϕ	ϕ
r	ϕ	ϕ	{s}	ϕ
s	{s}	{s}	{s}	ϕ
t	ϕ	ϕ	{u}	ϕ
u	ϕ	ϕ	ϕ	ϕ

Question 3.

1. Load the NFA in the file NFA-2.jflap, as shown below.
2. Verify that $Q = \{q0, p, q, r, s, t, u\}$.
3. Which state is the initial state?
4. What is F?
5. Verify that $\delta(p, a) = \{q, t\}$.
6. What is $\delta(q0, \lambda)$?
7. What is $\delta(r, b)$?
8. What is $\delta(t, \lambda)$?
9. What is $\delta(u, b)$?
10. What is $\delta(s, c)$?



q0 is the initial state.
F = {s,u}
δ(q0, λ) = {p}
δ(r, b) = {}
δ(t, λ) = {}
δ(u, b) = {}
δ(s, c) = {s}

Question 4. Do NFA-1.jflap and NFA-2.jflap accept the same set of words? Explain your answer in detail.

Yes, because they are the same NFA, except the λ transition in NFA-2.

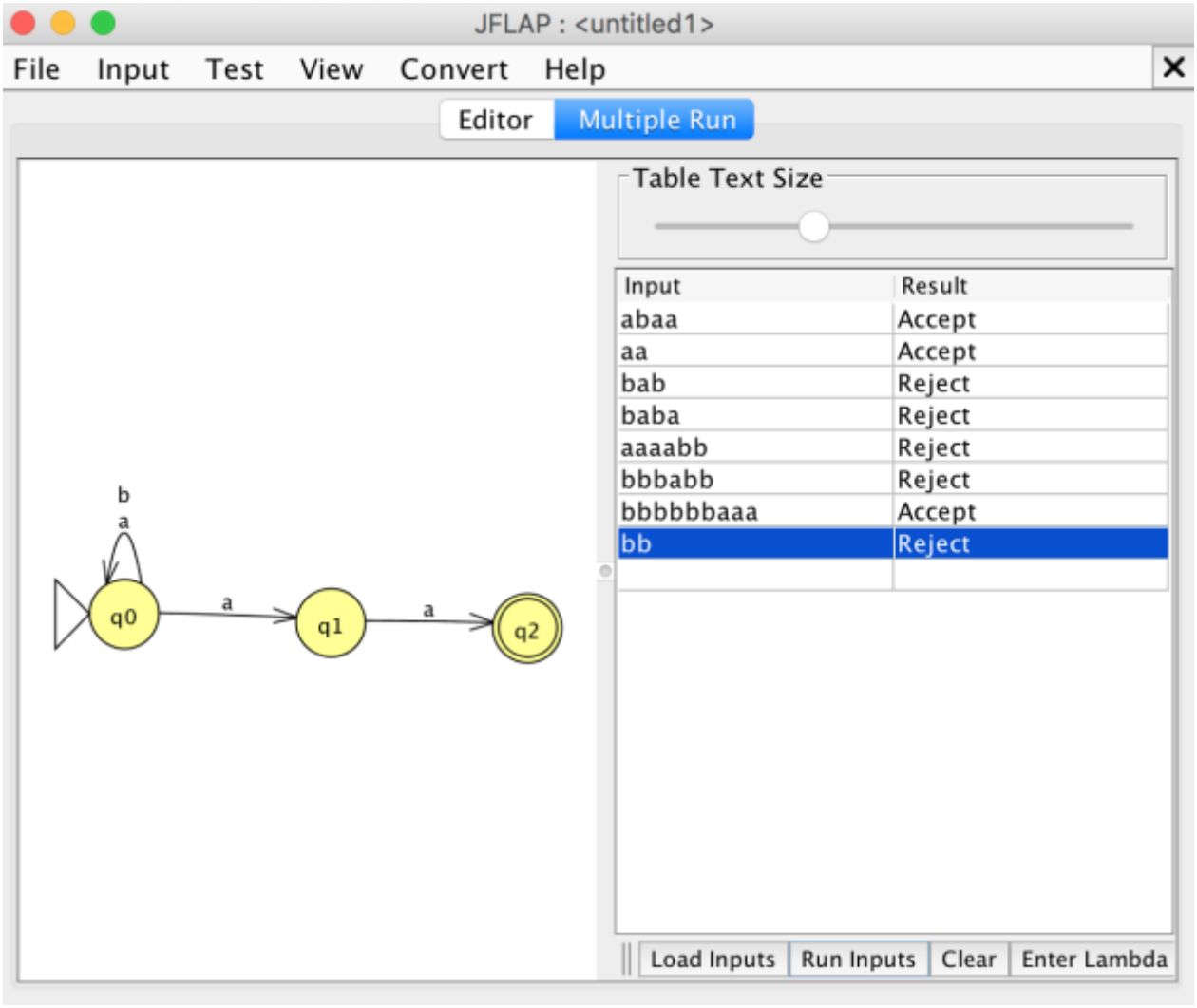
Exercise 1

Define an NFA that recognizes the following language L over Σ = {a, b}:

$$L = \{ w \mid w \text{ ends with aa} \}.$$

Recall that an NFA is defined as a 5-tuple (Q, Σ, δ, q0, F) where

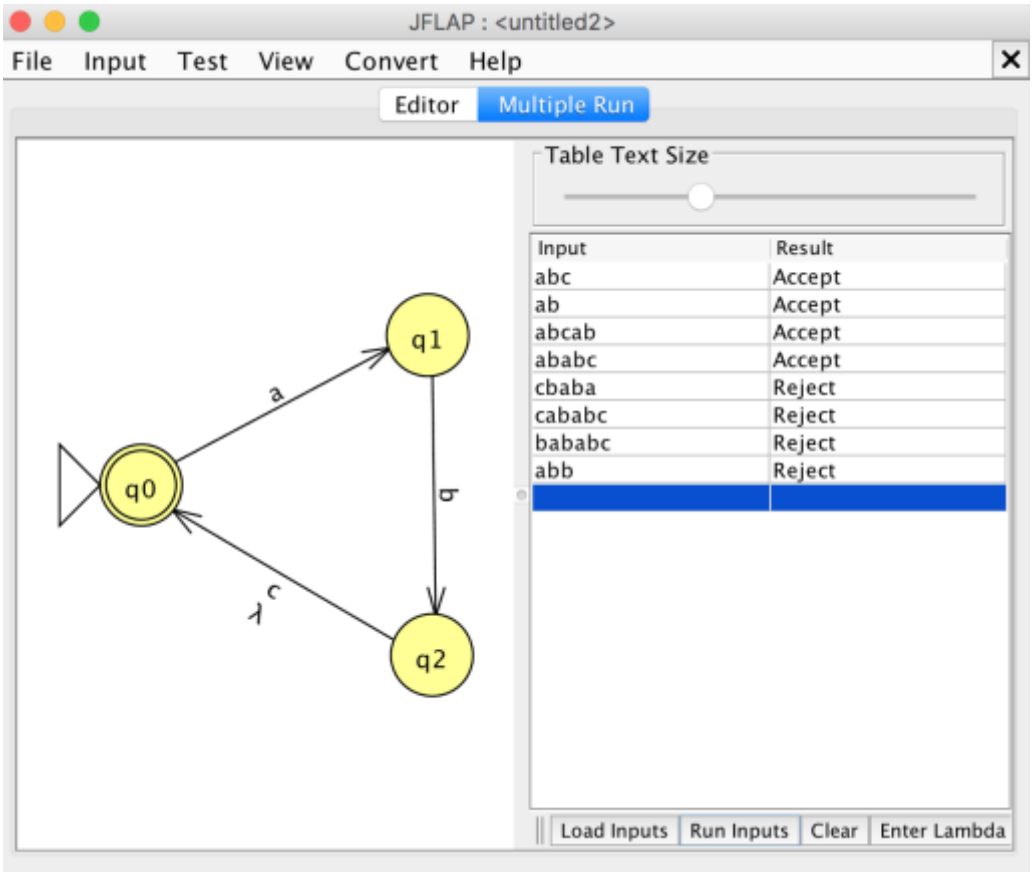
- Q is a finite set of states
- Σ is a finite alphabet
- δ is the transition function, $\delta: Q \times \Sigma_\varepsilon \rightarrow \text{PowerSet}(Q)$
- q0 is the start state (q0 □ Q)
- F is a set of accept states (F □ Q)



Exercise 2

Problem:

Construct an NFA that accepts the language `{ab, abc}*`. This is the set of strings where *ab* and *abc* may be repeated. Example strings include *abcab*, *ababcab*, *abcabcabc*, and the empty string.



Exercise 3

Given the Alphabet {a,b,c} construct a NFA which accepts (a|b|c)*c