

2025 NCKU CSIE Compiler Quiz 1 (Ch3)

Student ID:

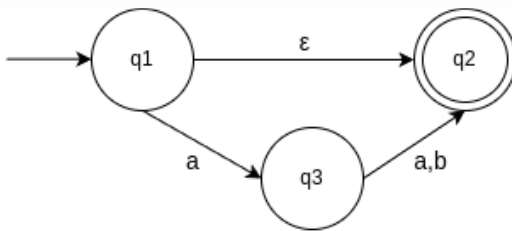
Department:

Name:

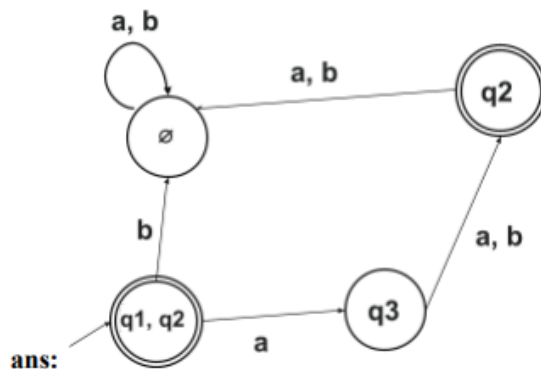
ϵ -NFA & DFA 繪圖扣分機制：

- 未標示進入 \rightarrow 不扣分
- \rightarrow 標示錯誤或未畫完整 (-5)
- 缺少 state (-10)
- accept state 未標示/註記/與其他 state 區隔 (-2)
- 有寫出 \emptyset state 但未標示/註記/與其他 state 區隔 (-5)

1. Transform the NFA below to DFA (30 points)



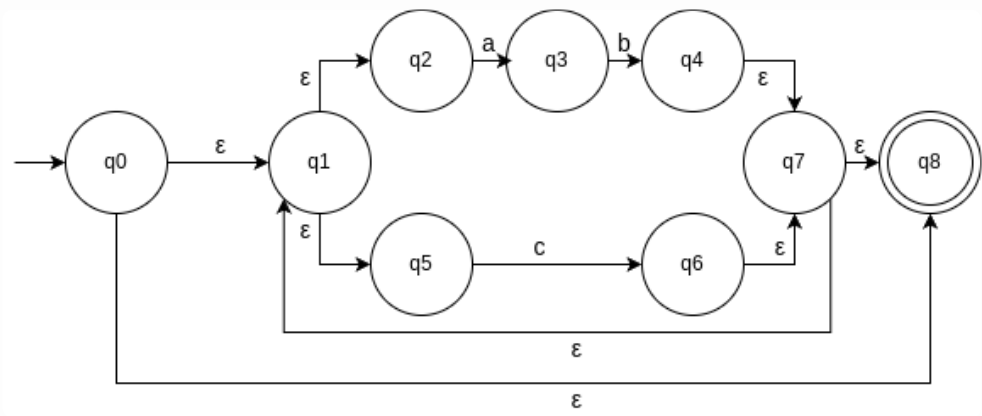
Ans:



2. Given regular expression $(ab|c)^*$ (40 points)

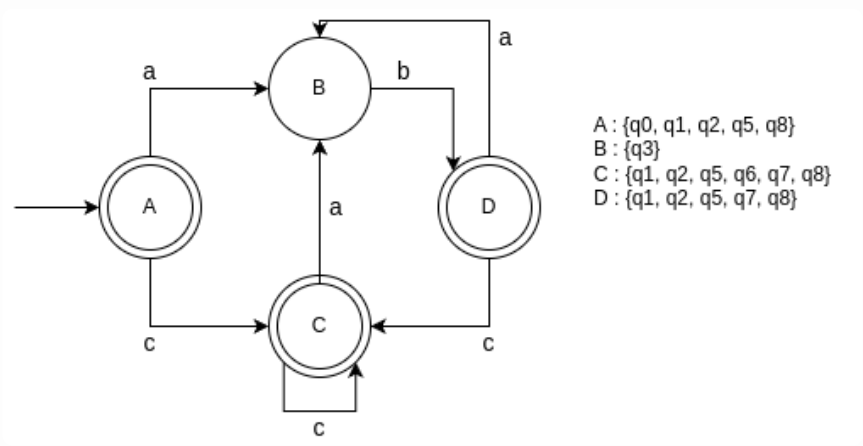
2.1 Construct ϵ -NFA. (20 points)

Ans:



2.2 Transform ϵ –NFA in 2.1 to DFA(10 points) using transition table(10 points).

Ans:



| State | a | b | c |
|----------------------------|------------|------------|------------|
| A:{q0, q1, q2, q5, q8} | B | ϵ | C |
| B:{q3} | ϵ | D | ϵ |
| C:{q1, q2, q5, q6, q7, q8} | B | ϵ | C |
| D:{q1, q2, q5, q7, q8} | B | ϵ | C |

3. Build a regular expression

3.1 評分標準:

- 邏輯錯誤 (-5), e.g. `\s* -> \s+`
- 符號錯誤 (-1), e.g. `\[-> [`

- 寫太長助教看不懂 (-20)

3.2 評分標準:

- 錯了 (-10) 😊

3.1 Find a non-empty Python-like list (20 points)

The target string must begin with a `[` and end with a `]`. It contains one or more variables separated by commas, each of them is a non-empty string consisting of lowercase letters and digits. Spaces can be inserted arbitrarily.

Hint: `\s` matches a whitespace.

For example: `[a12]`, `[a12, b34]`, `[12a , 34b, c56]`

Not including, for example: `[A]`, `[c,]`, `[a12, ,b34]`

Ans:

```
\[\s*[a-z0-9]+\s*(,\s*([a-z0-9]+\s*))*\]
```

至少一個字母和數字也算對

```
variable = \s*([a-z][0-9]|[0-9][a-z])[a-z0-9]+\s*\n\[variable(,variable)*\]
```

3.2 Zero or one? (10 points)

A string consisting of zero or more 0s and exactly one 1, and followed by nothing **or** followed by a string begin with 1 followed by a string consisting of zero or more 0s and exactly one 1.

For example: `010`, `1`, `111`, `010100100`, `100000`

Not including, for example: `0`, `000`

Ans:

```
(0*10*)(10*10*)?
```