

# Homework 2

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## Homework Description

Introduction assignment to languages, grammar, and finite state machines.

## Course Details

- **Course** - CS435
- **Instructor** - Dr. Chi-Cheng Lin

## Homework Results

### Problem Set 1

Exercises from Chapter 5.

- JFLAP file for DFSM
- A picture of diagram and accepting/rejecting runs

#### Problem 2a

$\{w \in \{a, b\}^* : \text{every } a \text{ in } w \text{ is immediately preceded and followed by } b\}$

#### JFLAP file

jflap/2a.jff

#### Results

The JFLAP interface displays a DFA diagram on the left and a table of input strings and their results on the right.

**DFA Diagram:**

```

graph LR
    start(( )) --> q4((q4))
    q4 -- a --> d((d))
    q4 -- b --> q0((q0))
    q0 -- b --> q0
    q0 -- a --> q1((q1))
    q1 -- a --> d
    q1 -- b --> q2((q2))
    q2 -- a --> q1
    q2 -- b --> q2
    d -- a --> d
    d -- b --> d
    style start fill:none,stroke:none
  
```

**Table:**

Input	Result
	Accept
bbb	Accept
babbab	Accept
bbababab	Accept
aa	Reject
bba	Reject
abbab	Reject
abbab	Reject
babbaab	Reject

Buttons at the bottom: Load Inputs, Run Inputs, Clear, Enter Lambda, View Trace.

**Problem 2d**

$\{w \in \{0, 1\}^* : w \text{ corresponds to the binary encoding, without leading 0's, of natural numbers that are powers of 4}\}$

**JFLAP file**

jflap/2d.jff

**Results**

Table Text Size

Input	Result
1	Accept
100	Accept
10000	Accept
1000000	Accept
	Reject
0	Reject
0100	Reject
10100	Reject
100000	Reject
11000000	Reject

Load Inputs Run Inputs Clear Enter Lambda View Trace

**Problem 2h**
 $\{w \in \{a, b\}^* : w \text{ has } bbab \text{ as a substring}\}$ 
**JFLAP file**

jflap/2h.jff

**Results**

Table Text Size

Input	Result
abbabb	Accept
bbbabaa	Accept
aabbabbabab	Accept
	Reject
abba	Reject
bbaaba	Reject
aababba	Reject

Load Inputs Run Inputs Clear Enter Lambda View Trace

**Problem 2n**

$$\{w \in \{a, b\}^* : (\#_a(w) + 2\#_b(w)) \equiv_5 0\}.$$

**JFLAP file**

jflap/2n.jff

**Results**

Table Text Size

Input	Result
	Accept
abb	Accept
bbbbbb	Accept
babbab	Accept
aababba	Accept
abba	Reject
aaaaaa	Reject
aabbabb	Reject

Load Inputs Run Inputs Clear Enter Lambda View Trace

**Problem Set 2**

Exercises from Chapter 5

- JFLAP file for the NDFSM
- A picture of diagram and accepting/rejecting runs

**Problem 6a**

$$\{a^n b a^m : n, m \geq 0, n \equiv_3 m\}.$$

**JFLAP file**

jflap/6a.jff

**Results**

Table Text Size

Input	Result
b	Accept
aaab	Accept
baaaaa	Accept
aabaaaaa	Accept
aaaaba	Accept
aaaabba	Reject
aaaabba	Reject
aabaaa	Reject
aaaaaabaa	Reject

Load Inputs Run Inputs Clear Enter Lambda View Trace

**Problem 6b**

$\{w \in \{a, b\}^* : w \text{ contains at least one instance of } aaba, bbb \text{ or } ababa\}.$

**JFLAP file**

jflap/6b.jff

**Results**

