Final:

一. 12判断 24' 二. 证 not regular 15' 三. 构造 FA 和 CFG 20' 四. 构造 PDA 15'?

五. 描述 3 tape TM 10' 六. 两个归约 20'

一.
- regular 的 closure property.
- DFA with k states. L(DFA) contains a string len ≤ k.
- CFG (in CNF) $\Rightarrow^{*}$ a string len $\geq 2^{|R|}$ $\Rightarrow$ L(CFG) is infini
- μ-recursive set not decidable. X 2题
- {M : ∃ TM L(M) ≤ H} is recursive.
- A: regular. B context-free. A can never be reduced to B.
-
-

二. {uv2w : u, v, w ∈ {0,1}*, |u| = 2|v| + 1 & |v| ≠ |w|} regular?

三. DFA or NFA with ≤ 5 states & ≤ 8 transitions:

$w \in \{0,1\}^{*}$

{w : The last 4 digits of w has at least a 1}.

(if w less than 4 digits, then in |w|).

CFG with ≤ 3 variables & ≤ 15 rules:

{uv : u, v ∈ {0,1}*, u differs with v^R in exactly 2 digits}

四. PDA: $\{w : w \in \{0,1\}^* \ \#_0(w) = 2\#_1(w) \ \& \ |w| \text{ is odd}\}$.

五. (i) Describe the idea of simulating NTM with 3-tape DTM.
(ii) Describe the functions of 3 tapes.
(iii) Describe how this 3-tape DTM works.

六. R. RE not R or not RE:
$A_1 = \{M : M \text{ halts on some input within } 2023 \text{ steps}\}$.
$A_2 = \{M : M \text{ halts on at most } 2023 \text{ palindromes}\}$.