Assignment 2

1) Which of following is true?

- Every NFA is a set of some DFAs
- NFA is a 6 tuple
- Every DFA is an NFA
- Every NFA is a DFA

Accepted Answers:
Every DFA is an NFA

2) Which of following is true?

- A language accepted by a DFA is also accepted by some NFA and vice-versa
- A language accepted by an NFA is also accepted by some DFA but not vice-versa
- DFA is 5-tuple but not NFA
- A language accepted by a DFA is also accepted by some NFA but not vice-versa

Accepted Answers:
A language accepted by a DFA is also accepted by some NFA and vice-versa

3) Which of following is true?

- A language accepted by a regular expression is also accepted by some NFA and some DFA.
- A language accepted by a regular expression is also accepted by some NFA but not necessarily accepted by a DFA.
- A language accepted by a regular expression is may not be accepted by any NFA or DFA.
- A language accepted by a regular expression is accepted by some DFA but not necessarily accepted by an NFA.

Accepted Answers:
A language accepted by a regular expression is also accepted by some NFA and some DFA.

4) Regular languages are closed over

- concatenation
- union

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Accepted Answers:

- union
- intersection
- complement
- concatenation

5) Which of following is true?  

- For every regular language there exists a GNFA with atmost 2 states that accepts the language
- Every GNFA can be converted to a regular expression such that both accept same language
- Every DFA cannot be converted to a regular expression such that both accept same language
- Every NFA can be converted to a regular expression such that both accept same language

Accepted Answers:

- Every GNFA can be converted to a regular expression such that both accept same language
- Every NFA can be converted to a regular expression such that both accept same language
- For every regular language there exists a GNFA with atmost 2 states that accepts the language

6) What is the language accepted by following regular expression?  

- $0^*(1(01^*0)^1)*0^*$

- Binary representation of multiples of 6
- Binary representation of multiples of 4
- Binary representation of multiples of 3
- Binary representation of multiples of 2

Accepted Answers:

- Binary representation of multiples of 6

7) What is the language accepted by following NFA?  

- Strings with atleast one 1 in it
- Complement of language accepted by regular expression $0^*$
- Language accepted by regular expression $0^*10^*$
- Strings with exactly one 1 in it

Accepted Answers:

- Complement of language accepted by regular expression $0^*$
- Strings with atleast one 1 in it

8) $NOPREFIX(L) = \{w \in L \mid \text{no prefix of } w \text{ is in } L\}$. Which of following are true?  

- $NOPREFIX(L)$ is regular
- $NOPREFIX(L)$ is context-free
- $NOPREFIX(L)$ is context-sensitive
- $NOPREFIX(L)$ is recursively enumerable

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For any regular language \( L \), \( NOPREFIX(L) \) is not regular.

For some regular language \( L \), \( NOPREFIX(L) \) are not regular.

For some regular languages \( L \), \( NOPREFIX(L) \) is regular but not all.

Regular languages are closed under \( NOPREFIX \).

**Accepted Answers:**

Regular languages are closed under \( NOPREFIX \).

9) \( DROP\-ONE(L) = \{xz \mid xyz \in L \text{ where } x, z \in \Sigma^* \text{ and } y \in \Sigma \} \). Which of following are true?

- Regular languages are closed under \( DROP\-ONE \).
- For any regular language \( L \), \( DROP\-ONE(L) \) is not regular.
- For some regular language \( L \), \( DROP\-ONE(L) \) are not regular.
- For some regular languages \( L \), \( DROP\-ONE(L) \) is regular but not all.

**Accepted Answers:**

Regular languages are closed under \( DROP\-ONE \).