**Basic Understanding**

1. **Which of the following is true for a Deterministic Finite Automaton (DFA)?**  
   A. It allows multiple transitions for a given input symbol.  
   B. It accepts infinite input alphabets.  
   C. For each state and input symbol, there is exactly one transition.  
   D. It can use a stack for memory.  
   ✅ **Answer:** C
2. **What is the main difference between a DFA and an NFA?**  
   A. NFA does not use states.  
   B. DFA accepts more languages than NFA.  
   C. DFA requires exactly one transition for each input symbol from each state.  
   D. DFA is slower than NFA.  
   ✅ **Answer:** C
3. **A DFA must have:**  
   A. Multiple start states  
   B. At least one accepting state  
   C. Only one accepting state  
   D. Only one start state  
   ✅ **Answer:** D

**🔹 Transitions and Construction**

1. **In a DFA, the transition function δ maps:**  
   A. Q × Σ → P(Q)  
   B. Q × Σ → Q  
   C. Q × Q → Σ  
   D. Σ × Q → Q  
   ✅ **Answer:** B
2. **What will happen if a DFA has no accepting states?**  
   A. It accepts all strings  
   B. It rejects all strings  
   C. It behaves like an NFA  
   D. It accepts only the empty string  
   ✅ **Answer:** B
3. **Which of the following can a DFA not do?**  
   A. Accept strings with a fixed number of 1s  
   B. Accept strings that are palindromes  
   C. Accept strings ending with 101  
   D. Accept strings over {a, b} that contain 'ab' as a substring  
   ✅ **Answer:** B

**🔹 Language Recognition**

1. **Which language is accepted by a DFA with a single state that is both the start and accepting state, and no transitions?**  
   A. {ε}  
   B. {}  
   C. All strings  
   D. {0,1}\*  
   ✅ **Answer:** A
2. **Which of the following statements is correct?**  
   A. All DFAs are also NFAs  
   B. All NFAs are DFAs  
   C. NFAs are more powerful than DFAs  
   D. DFAs accept more languages than NFAs  
   ✅ **Answer:** A
3. **What language does a DFA with states {q0, q1}, q0 as start and accepting, and transitions δ(q0, 0) = q1, δ(q0, 1) = q0, δ(q1, 0) = q0, δ(q1, 1) = q1 accept?**  
   A. Strings with even number of 0s  
   B. Strings with even number of 1s  
   C. Strings that end with 0  
   D. Strings that contain both 0 and 1  
   ✅ **Answer:** A

**🔹 Theory & Closure Properties**

1. **The set of all strings accepted by a DFA is:**  
   A. A context-free language  
   B. A regular language  
   C. A context-sensitive language  
   D. A non-regular language  
   ✅ **Answer:** B
2. **Which operations are closed under regular languages?**  
   A. Union  
   B. Intersection  
   C. Complement  
   D. All of the above  
   ✅ **Answer:** D
3. **If a DFA has *n* states, the maximum number of transitions it can have is:**  
   A. n  
   B. n²  
   C. n × |Σ|  
   D. 2ⁿ  
   ✅ **Answer:** C

**🔹 Advanced Insight**

1. **Which of the following languages cannot be recognized by any DFA?**  
   A. L = { w ∈ {0,1}\* | w ends with 01 }  
   B. L = { w ∈ {0,1}\* | number of 1s is even }  
   C. L = { w ∈ {0,1}\* | w is a palindrome }  
   D. L = { w ∈ {0,1}\* | w contains the substring 000 }  
   ✅ **Answer:** C
2. **What does the minimization of a DFA achieve?**  
   A. Reduces the number of transitions  
   B. Converts it to an NFA  
   C. Reduces the number of states without changing the language  
   D. Increases its computational power  
   ✅ **Answer:** C
3. **Which of the following is always true for a minimized DFA?**  
   A. It has one accepting state  
   B. It accepts only strings of even length  
   C. It has no unreachable states  
   D. It has no start state  
   ✅ **Answer:** C