Q1: A language is regular if _____? Select all that apply. *

- It is a non-empty set of strings over an alphabet
- It is the empty set.
- All strings in the language are accepted by an NFA and this NFA accepts nothing not in the language.
- All strings in the language are accepted by a DFA and this DFA accepts nothing not in the language.

Q2: Which of the following pairs of regular languages are equivalent? Select all that apply. *

- $x^*x^+$ vs. $x^+$
- $((a+b)^*)$ vs. $(ab)^*$
- $(ab)^*a$ vs. $a(ba)^*$
- $0^*1^*0^+$ vs. $(01)^*0^+$
Q3: What is the set of reachable states for input string 0011? *

- {q0, q1, q2, q3}
- {q0, q1, q2}
- {q1, q2}
- {q0, q1}
- {q3}

The correct answer is {q0, q1, q2}. 

Diagram:

- q0
  - 0, 1
  - 1 → q1
  - 0, 1 → q2
  - 0, 1 → q3

Input string 0011 is processed as follows:

1. Start at q0.
2. Read 0, move to q0.
3. Read 0, move to q1.
4. Read 1, move to q2.
5. Read 1, move to q3.

The states reached are {q0, q1, q2}.
Q4: Let the top DFA be a DFA for language L1 and let the bottom NFA be an NFA for L2. How do L1 and L2 relate to each other? Select all that apply. Hint: an odd number plus an even number is an odd number.

- L1 is a subset of the complement of L2
- L1 is a subset of L2
- L1 = L2
- The complement of L1 is disjoint from L2

Q5: Given an NFA with n states, the maximum number of states in an equivalent DFA is

- n!
- $2^n$
- $n^2$
- 2n