

**Answer on Question #37836 - Math – Other**

Given an arbitrary non-deterministic finite automaton (NFA) with  $N$  states, the maximum number of states in an equivalent minimized DFA is least

- a)  $N^2$
- b)  $2^N$
- c)  $2N$
- d)  $N!$

**Solution:**

In the theory of computation and Automata theory, the powerset construction or subset construction is a standard method for converting a nondeterministic finite automaton (NFA) into a deterministic finite automaton (DFA) which recognizes the same formal language. It is important in theory because it establishes that NFAs, despite their additional flexibility, are unable to recognize any language that cannot be recognized by some DFA.

It is also important in practice for converting easier-to-construct NFAs into more efficiently executable DFAs. However, if the NFA has  $N$  states, the resulting DFA may have up to  $2^N$  states, an exponentially larger number, which sometimes makes the construction impractical for large NFAs.

**Answer: b)**