(1) $\{ \langle N \rangle : N = p \cdot q \}$. where N's product of two primes p and q

(2) $\{ x : (x \in N) : x = p \cdot q$ where $p \cdot q$ are prime number $\}$

(3) all strings of the positive instance of the problem with NFA A into
$\{ \langle s : A \rangle$ an NFA A accept $S \}$.

(4). the string for a NFA: $\{ \langle s \rangle$: An NFA A accept $S \}$

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proof $2n^3 - 18n$ is $O(n^3)$

Take $C = 3$. Then we have.

$$\lim_{n \to \infty} \frac{2n^3 - 18n}{3 \cdot n^3} = \frac{2}{3} < 1$$

proof $2n^3 - 18n$ is $O(n^4)$

Take $C = 1$. Then we have

$$\lim_{n \to \infty} \frac{2n^3 - 18n}{1 \cdot n^4} = 0 < 1.$$

proof $2n^3 - 18n$ is not $O(n^2 \log n)$

there is a const $C > 0$

$$\lim_{n \to \infty} \frac{2n^3 - 18n}{C \cdot n} = \frac{2n^2 - 18}{C} = +\infty \geq 1.$$

Thus, $2n^3 - 18n$ is $O(n^3)$, $O(n^4)$, is not $O(n^2 \log n)$

$3n^2 2^{2n}$ is $2^{o(n)}$

take $C = 3$. we have.

$$\frac{3n^2 2^{2n}}{2^{3n}} = \frac{3n^2}{2^n} = 0 < 1.$$

Thus $3n^2 2^{2n}$ is $2^{o(n)}$