Design ***nondeterministic*** finite-state automata that accept the following languages over the binary alphabet $\{0,1\}$. Briefly describe how your NFA works.

Your NFAs can have multiple start states and/or $\varepsilon$-transitions, but remember to write that down as part of your description. Either drawings or formal descriptions are acceptable, as long as the states $Q$, the start state $s$ (or start states $S$), the accepting states $A$, and the transition function $\delta$ are all clear.

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0. $\emptyset$

1. Binary strings that end with the suffix $001$.

2. Binary strings that contain at least one of the substrings $11$, $101$, and $1001$.

3. $(01)^*(010)^*(10)^*$

4. $\left\{w \in \{0,1\}^* \;\middle|\; \min\{\#(0,w), \#(1,w)\} \le 3\right\}$

5. Binary strings that contain a substring of the form $1x1$, where $|x|$ is odd.

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**Problems to think about later:**

6. Binary strings with length at least 7 whose 7th symbol from the end is $1$.

7. Binary strings that contain at least one palindrome[1] substring of length 4. *[Hint: What are the palindromes of length 4?]*

8. Binary strings that contain both $01010$ and $1001001$ as substrings.

9. Binary strings that contain *at least two* of the substrings $11$, $101$, and $1001$.

[1] A *palindrome* is a string that is equal to its reversal, like A or POOP or STRESSED◇DESSERTS or the empty string.