Describe deterministic finite-state automata that accept each of the following languages over the alphabet $\Sigma = \{0, 1\}$. Describe briefly what each state in your DFAs *means*.

Either drawings or formal descriptions are acceptable, as long as the states Q, the start state s, the accept states A, and the transition function δ are all clear. Try to keep the number of states small.

1. All strings containing the substring **000**.

2. All strings *not* containing the substring **000**.

3. All strings in which every run of **0**s has length at least 3.

4. All strings in which **1** does not appear after a substring **000**.

5. All strings containing at least three **0**s.

6. Every string except **000**. *[Hint: Don't try to be clever.]*

Work on these later:

7. All strings w such that *in every prefix of w*, the number of **0**s and **1**s differ by at most 1.

8. All strings containing at least two **0**s and at least one **1**.

9. All strings w such that *in every prefix of w*, the number of **0**s and **1**s differ by at most 2.

★10. All strings in which the substring **000** appears an even number of times.
   (For example, **0001000** and **0000** are in this language, but **00000** is not.)