For each of the following languages over the alphabet $\Sigma=\{0,1\}$, either prove the language is regular (by giving an equivalent regular expression, DFA, or NFA) or prove that the language is not regular (using a fooling set argument). Exactly half of these languages are regular.

1. $\left\{0^{n} 10^{n} \mid n \geq 0\right\}$
2. $\left\{0^{n} 10^{n} w \mid n \geq 0\right.$ and $\left.w \in \Sigma^{*}\right\}$
3. $\left\{w 0^{n} 10^{n} x \mid w \in \Sigma^{*}\right.$ and $n \geq 0$ and $\left.x \in \Sigma^{*}\right\}$
4. Strings in which the number of 0 s and the number of 1 s differ by at most 2 .
5. Strings such that in every prefix, the number of 0 s and the number of 1 s differ by at most 2 .
6. Strings such that in every substring, the number of 0 s and the number of 1 s differ by at most 2 .
