* Strings that have 1 on every odd position.

$$(1(0+1))^+$$

* All strings not containing the substring 110.

If we see 11, then we cannot see 0's. Before this happens, once we see a 1, it must be followed by a 0.

$$(0+(10)^*)^*1^* = (0+10)^*1^*$$

* All strings not containing the substring 101.

The string can begin and end with any number of 0's. However, a 1 must be followed either by no 0's or at least two 0's before encountering another 1.

$$0^*(1+000^*)^*0^*$$

* Strings containing an even number of 0's.

$$(1^*01^*01^*)^* + 1^*$$

↳ the case when there are no 0's at all.

* The set containing the binary expansions of integers that are powers of 4.

We have $4^m = 1\underbrace{00\ldots0}_{2m}$ in binary, so the expression we want is $1(00)^*$.