1. What language is accepted by the following DFA?

Answer: Binary strings of even length.

2. What language is accepted by the following NFA?

Answer: Binary strings ending in “01” or “010”.

3. Find the simplest DFA you can that accepts binary strings of any length except for 2.

Answer:

4. Find the simplest NFA you can that accepts:

(a) The language denoted by $x(yy? | (yz)^*)$.

Answer:

(b) The language denoted by $(01)^*010*1$.
5. What language is accepted by the following NFA?

![NFA Diagram]

**Answer:** Binary strings with different first and last bits.

6. What language is accepted by the following DFA?

![DFA Diagram]

**Answer:** Binary strings not containing 101 as a substring.

7. Convert each of the following NFAs to a DFA:

(a) The NFA from Exercise 4(b).

![NFA Diagram]

**Answer:**

(b) The NFA from Exercise 5.

![NFA Diagram]
8. (Challenge Question) Find the simplest NFA you can that accepts:

(a) Decimal numbers divisible by 3. (Leading zeros are okay.)

Answer:

(b) Binary numbers divisible by 5. (Leading zeros are okay.)

Answer:

9. (Challenge Question) Write a regular expression for the language in each of Exercises 8(a) and 8(b).

Answer: Very complex. See http://www.andrew.cmu.edu/user/ko/pdfs/lecture-5.pdf for one algorithm to convert NFAs to regular expressions.