REs & DFAs WORKSHEET - SOLUTIONS

1. Consider the regular expression ((C|D|M|N|P|T)A)*

   a. Is PAPA matched by this RE? Is MAMAN? Is NAPA? Is TAMPA?
      PAPA & NAPA

   b. Name two countries that are matched by this RE.
      PANAMA & CANADA

2. RElay Race - Write regular expressions for the following languages:

   a. all binary strings

      (0|1)*

   b. all non-empty binary strings

      (0|1)+ OR (0|1)(0|1)*

   c. all binary strings beginning and ending with 1

      1|1(0|1)*1

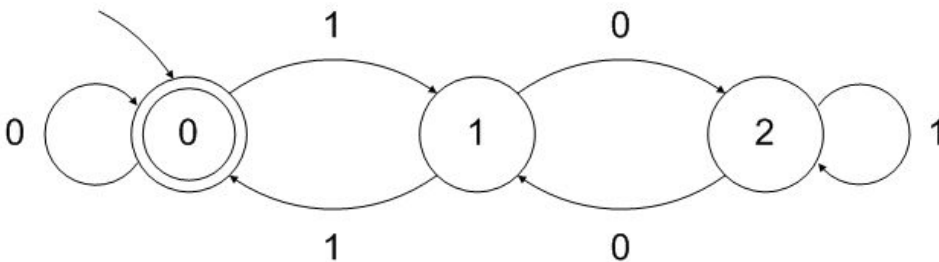   d. all binary strings ending with 00 (divisible by 4)

      (0|1)*00

   e. all binary strings with at least three 1s

      0*10*10*1(0|1)* , (0|1)*1(0|1)*1(0|1)*1(0|1)* , ETC

3. Given an English-language description of the language defined by the RE (0*10*10*)*?

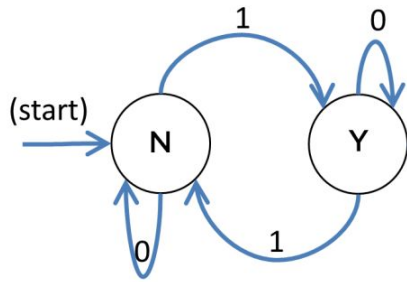   **All binary strings with both a positive and even number of 1s**

4. BONUS: is it possible to define a RE for all binary integers divisible by 3?

   0 | 0*1(10*1 | 01*0)*10*

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5. Consider this DFA:

   a. Is 01101 accepted by this DFA? **YES**

   b. Is 11? **NO**

   c. Given an English-language description of the language that this DFA recognizes.
      All binary strings with an odd number of 1s

   d. (Optional) Give a regular expression that defines the same language

      0*10*(0*10*10*)*
         (other formulations possible)

6. Draw DFAs that recognize each of these languages from Question 2:

Language	Regular Expression	DFA
All binary strings	(0|1)*	
All binary strings except empty string	(0|1)(0|1)*	
Begins with 1, ends with 1	1 | 1(0|1)*1	
Ends with 00	(0|1)*00	
Contains at least three 1s	(0|1)*1(0|1)*1(0|1)*1(0|1)*	

Legend
N Non-Accepting State
Y Accepting State

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