# Worksheet 3 Regular Expressions Answers

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| --- | --- |
| Symbol | Meaning |
| | | Separates alternatives (or, ⋁) |
| \* | Indicates that there are *zero or more* of the preceding element |
| + | Indicates that there is *one or more* of the preceding element |
| ? | Indicates that there are *zero or one* of the preceding element |

# Task 1

1. Complete the table. All expressions are binary expressions using only the digits 0 and 1.

|  |  |
| --- | --- |
| **Regular Expression** | **Requirements** |
| 0|1 | 0 or 1 |
| 1+ | All 1s |
| (0|1)+ | All binary strings |
| (0|1)\*1 | Binary string ending with a 1 |
| 1(0|1)\* | Binary string beginning with 1 |
| (0|1)\*00 | Binary string ending with 00 |
| (0|1)\*1(0|1)\*1(0|1)\*1(0|1) | Has at least 3 1s anywhere |
| (0|1)\*111(0|1)\* | Has at least 3 1s in a row somewhere |
| (0|1)\*110(0|1)\* | Includes the substring 110 |
| (0|10)\*1\* | Cannot include the substring 110 |
| (0|1)((0|1)(0|1))\* | Must be an odd length |

1. Given the regular expression, indicate which strings are accepted and which are rejected. Note: C = {A…Z} L = {a…z} D = {0 …9}

(C|L)(C|L)\*D

45AB rejected, Aa3, M4, JK94 rejected

(C|L)D\*(C|L)D

A35Q7, Dd7, 73K rejected, E45a3

D+(C|L)+D?

7k, 99Pp77 rejected, 57ABC3, AD73 rejected

DCL(D\*|L+)

3Ww754, 7b24, 8Qaa9, B78

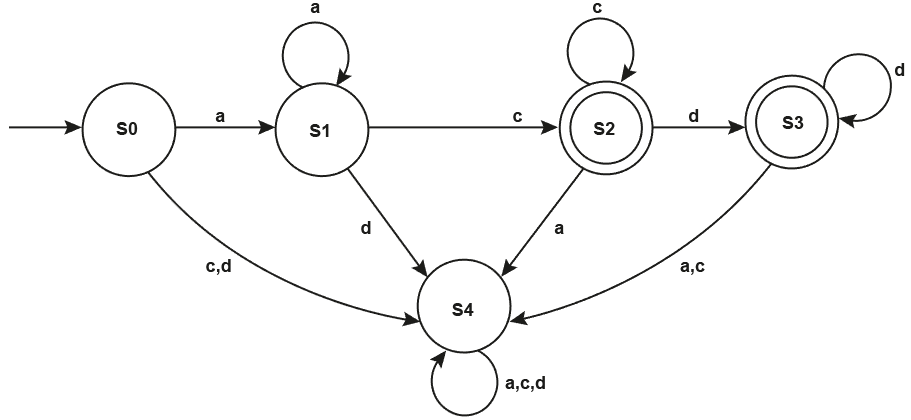
(last 3 rejected)

**Task 2**

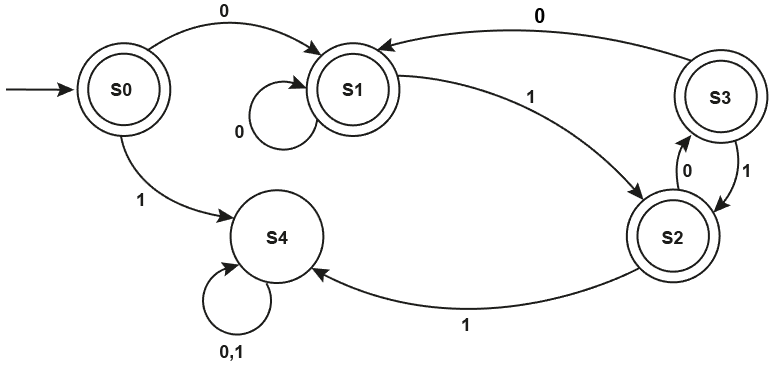
1. Write the regular expressions described by these FSMs.
2. (ab)\*



1. a+c+d\*



1. ((0+1?)0?)\*



**Task 3**

1. Construct FSMs for the following regular expressions.
2. ab\*a
3. 10+1
4. a+b+
5. 1(01)+1

|  |  |
| --- | --- |
| (a) | C:\Users\Rob\AppData\Roaming\PixelMetrics\CaptureWiz\Temp\40.png |
| (b) | C:\Users\Rob\AppData\Roaming\PixelMetrics\CaptureWiz\Temp\154.png |
| (c) | C:\Users\Rob\AppData\Roaming\PixelMetrics\CaptureWiz\Temp\47.png |
| (d) | C:\Users\Rob\AppData\Roaming\PixelMetrics\CaptureWiz\Temp\1.png |
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