

## 1. Regular Expressions

1. The set of all alphabetic strings.

**Answer:** `([a-zA-Z]+)`

2. The set of all alphabetic words

**Answer:** `\b([^\d\W]+\b)`

3. The set of all lower case alphabetic strings ending in a b

**Answer:** `([a-z]*b)`

4. The set of all lower case alphabetic words ending in a b

**Answer:** `\b([a-z]*b)\b`

5. The set of all strings from the alphabet {"a", "b"} such that each "a" is immediately preceded by and immediately followed by at least one "b"

**Answer:** `(b+a{0,1}b+|b)`

6. The set of all words from the alphabet {"a", "b"} such that each "a" is immediately preceded by and immediately followed by at least one "b"

**Answer:** `\b(b+a{0,1}b+)\b`

7. the set of all strings from the alphabet {"a", "b"} that form the pattern  $a^n b^m$  where  $(n+m)$  is even;  $n \geq 0$ ,  $m \geq 0$ , and  $(n+m) > 0$

**Answer:** `a(aa)*b(bb)*|(aa)+(bb)+|(aa)+(bb)+`

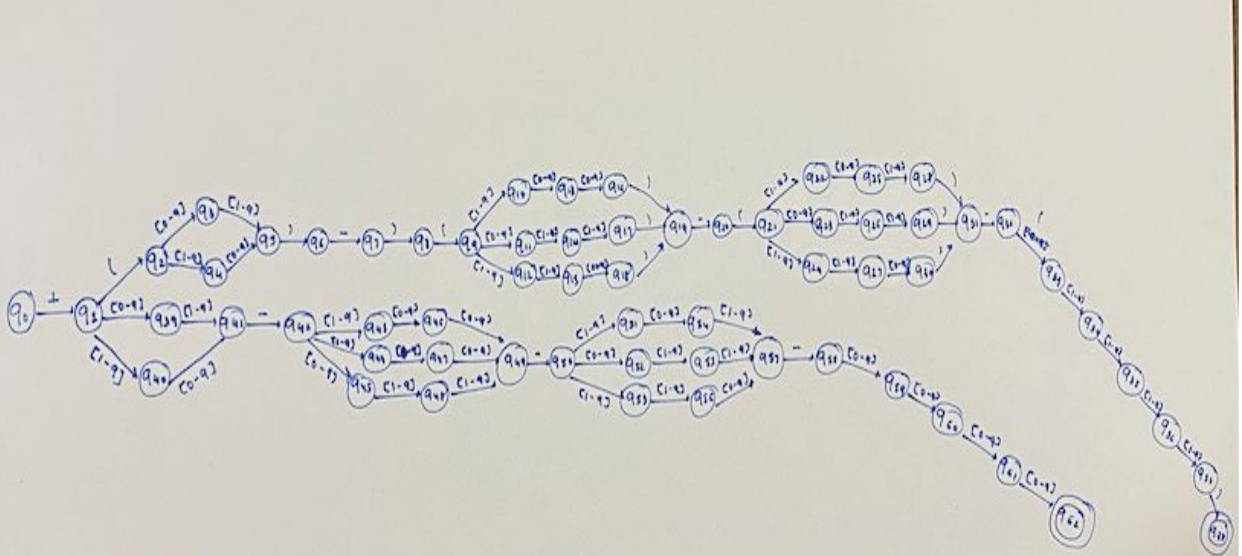
## 2. Social Security Number

**Answer:**

`\s((\d{2}[1-9][1-9]\d{2})\d[1-9]\d)-\d{2}-(\d{3}[1-9]\d{2}[1-9]\d|\d[1-9]\d{2}[\d{3}])((\d{2}[1-9][1-9]\d{2})\d[1-9]\d)\d{2}(\d{3}[1-9]\d{2}[1-9]\d|\d[1-9]\d{2}[\d{3}]))\s`

### 3. Telephone Number

**Answer:**

$$\begin{aligned} &(((+ (\backslash b \backslash d [1-9] | [1-9] \backslash d) - (\backslash d \{2\} [1-9] | \backslash d [1-9] \backslash d | [1-9] \backslash d \{2\}) - (\backslash d \{2\} [1-9] | \backslash d [1-9] \backslash d | [1-9] \backslash d \{2\}) - (\backslash d \{4\} \\ &\backslash b) | (+ (\backslash b \backslash d [1-9] | [1-9] \backslash d) \backslash) - (\backslash d \{2\} [1-9] | \backslash d [1-9] \backslash d | [1-9] \backslash d \{2\}) \backslash) - (\backslash d \{2\} [1-9] | \backslash d [1-9] \backslash d | [1-9] \backslash d \{2\}) \backslash) - (\backslash d \{4\} \backslash b) \backslash)) \end{aligned}$$

$$Q = \{q_0, q_1, \dots, q_m\}$$
$$\Sigma = \{+, 0, 1, 2, 3, 4, 5, 6, 7, 8, 9, -, (, )\}$$

$q_0 = \text{start}$ .

$$F = \{q_{61}, q_{62}\}$$