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Regular Expression Examples

① $L = \{ w \in \{0,1\}^* : w \text{ starts with } '10' \}$

$10\,(0|1)^*$

② $L = \{ w \in \{0,1\}^* : w \text{ ends with } '10' \}$

$(0|1)^*\,10$

③ $L = \{ w \in \{0,1\}^* : w \text{ doesnot end with } '10' \}$

$(0|1)^*\,(11|00|01) \mid (0|1|\epsilon)$

④ $L = \{ w \in \{0,1\}^* : \text{length of } w \text{ is even} \}$

$((0|1)(0|1))^*$

or, $(00|10|01|11)^*$

⑤ $L = \{ w \in \{0,1\}^* : \text{length of } w \text{ is odd} \}$

$((0|1)(0|1))^*\,(0|1)$

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(6) $L = \{ w \in \{0,1\}^* : w$ contains "101" as substring$\}$

$(0|1)^* 101 (0|1)^*$

(7) $L = \{ w \in \{0,1\}^*$ doesn't contain "11"$\}$

$(0|10)^* (1|\epsilon)$

(8) $L = \{ w \in \{0,1\}^*$ doesnot contain "00"$\}$

$(1|01)^* (0|\epsilon)$

(9) $L = \{$ does not contain 111$\}$

$(0|10|110)^* (1|11|\epsilon)$

(10) $L = \{$ length expressed as $3k+2\}$

$((0|1)(0|1)(0|1))^* (0|1)(0|1)$

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(11) $\{$length expressed as $2k+1\}$

$((0|1)(0|1))^* (0|1)$

(12) $\{w$ contains "00" or "11"$\}$

$(0|1)^* 00 (0|1)^* \mid (0|1)^* 11 (0|1)^*$

(13) $L = \{ w$ contains at least two 1's$\}$

$(0|1)^* 1 (0|1)^* 1 (0|1)^*$

(14) $L = \{ w$ contains exactly two 1's$\}$

$0^* 1 0^* 1 0^*$

(15) $L = \{v$ contains at most two 1's$\}$

$0^* + 0^* 10^* + 0^* 10^* 10^*$

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(16) L = { length of w is not multiple of 3 }

$((0|1)(0|1)(0|1))^*(0|1)(0|1|\epsilon)$

(17) L = { Number of 1's in w is multiple of 3 }

$0^* \mid (0^*10^*10^*10^*)^*$

(18) L = { w starts & ends with same symbol }

$0(0|1)^*0 \mid 1(0|1)^*1 \mid 0 \mid 1$

(19) L = { w starts and ends with different symbol }

$0(0+1)^*01 + 1(0+1)^*10$

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(20) L = { w doesn't contain 01 }

1^*0^*

(21) L = { w contains 0 at every 3rd position }

$((0|1)(0|1)0)^*(0|1)(0|1) \mid ((0|1)(0|1)0)^* \mid (0|1) \mid ((0|1)(0|1)0)^*$

(22) L = { w have 0's & 1's in alternate }

$(1|\epsilon)(01)^*(0|\epsilon) \mid (0|\epsilon)(10)^*(1|\epsilon))$

(23) L_1 = w divisible by three

$(\Sigma\Sigma\Sigma)^*$ or, $((0|1)(0|1)(0|1))^*$

L_2 = every second letter is 0

$((0|1)0)^*(0|1|\epsilon)$

(A) $L_1 \cap L_2$

$(\Sigma 0 \Sigma 0 \Sigma 0)^*(\Sigma 0 \Sigma \mid \epsilon)$

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(24) $L = \{$ 0 followed by two 1's $\}$

$$1^*(0111^*)^*$$

(25) $L = \{$ w have 1 at every odd position $\}$

$$(1(0|1))^* \quad (1|\epsilon)$$