

Example 1: Let $\Sigma = \{a, b\}$. Write regular expression to define language consisting of strings w such that, w contains only a 's or only b 's of length zero or more.

Solution: $r = a^* + b^*$

Example 2: Let $\Sigma = \{a, b\}$. Write regular expression to define language consisting of strings w such that, w is of length one or more and contains only a 's or only b 's. $r = a^+ + b^+$

Solution: $r = a^+ + b^+$

Example 3: Let $\Sigma = \{a, b\}$. Write regular expression to define language consisting of strings w such that, w contains zero or more a 's followed by zero or more b 's

Solution: $r = a^*b^*$

Example 4: Let $\Sigma = \{a, b\}$. Write regular expression to define language consisting of strings w such that, w of length even

Solution: $r = [(a + b) (a + b)]^*$

Example 5: Let $\Sigma = \{a, b\}$. Write regular expression to define language consisting of strings w such that, w of length odd

Solution: $r = (a + b) [(a + b) (a + b)]^*$

Example 6: Let $\Sigma = \{a, b\}$. Write regular expression to define language consisting of strings w such that, w of length three

Solution: $r = (a + b) (a + b) (a + b)$

Example 7: Let $\Sigma = \{a, b\}$. Write regular expression to define language consisting of strings w such that, w of length atmost three

Solution: $r = (a + b + \epsilon) (a + b + \epsilon) (a + b + \epsilon)$

Example 8: Let $\Sigma = \{a, b\}$. Write regular expression to define language consisting of strings w such that, w of length odd containing only b 's

Solution: $r = (bb)^* b$

Example 9: Let $\Sigma = \{a, b\}$. Write regular expression to define language consisting of strings w such that, w starting with a always

Solution: $r = a(a + b)^*$

Example 10: Let $\Sigma = \{a, b\}$. Write regular expression to define language consisting of strings w such that, w starting and ending with b and having only a 's in between.

Solution: $r = b a^* b$

Example 11: Let $\Sigma = \{a, b\}$. Write regular expression to define language consisting of strings

w such that, w starting and ending with same double letter

Solution: $r = \{(aa (a + b)^* aa) \mid (bb (a + b)^* bb)\}$

Example 12: Let $\Sigma = \{a, b\}$. Write regular expression to define language consisting of strings w such that, w with starting and ending with different letters

Solution: $r = (a(a+b)^* b) \mid (b (a + b)^* a)$

Example 13: Let $\Sigma = \{a, b\}$. Write regular expression to define language consisting of strings w such that, w with at least two occurrence of a

Solution: $r = (a + b)^* a (a + b)^* a (a + b)^*$

Example 14: Let $\Sigma = \{a, b\}$. Write regular expression to define language consisting of strings w such that, w with exactly two occurrence of a

Solution: $r = b^* a b^* a b^*$

Example 15: Let $\Sigma = \{a, b\}$. Write regular expression to define language consisting of strings w such that, w with at most two occurrence of a

Solution: $r = b^* (a + \epsilon) b^* (a + \epsilon) b^*$

Example 16: Let $\Sigma = \{a, b\}$. Write regular expression to define language consisting of strings w such that, w with begin or end with aa or bb

Solution: $r = ((aa + bb) (a + b)^* + ((a + b)^* (aa + bb)))$

Example 17: Let $\Sigma = \{a, b\}$. Write regular expression to define language consisting of strings w such that, w with begin and end with aa or bb

Solution: $r = ((aa + bb) (a + b)^* (aa + bb)) + aa + bb$

Example 18: Let $\Sigma = \{a, b\}$. Write regular expression to define language consisting of strings

w such that, w with total length multiple of 3 always

Solution: $r = [(a + b) (a + b) (a + b)]^*$

Example 19: Let $\Sigma = \{a, b\}$. Write regular expression to define language consisting of strings w such that, w containing total a's as multiple of 3 always

Solution: $r = [b^* a b^* a b^* a b^*]^*$

Example 20: Let $\Sigma = \{a, b\}$. Write regular expression to define language consisting of strings w such that, w with exactly two or three b's

Solution: $r = a^* b a^* b a^* (b + \epsilon) a^*$

Example 21: Let $\Sigma = \{a, b\}$. Write regular expression to define language consisting of strings w such that, w with number of a's even

Solution: $r = b^* + (b^* a b^* a b^*)^*$

Example 22: Let $\Sigma = \{a, b\}$. Write regular expression to define language consisting of strings w such that, w in which b is always tripled

Solution: $r = (a + bbb)^*$

Example 23: Let $\Sigma = \{a, b\}$. Write regular expression to define language consisting of strings w such that, w with at least one occurrence of substring aa or bb

Solution: $r = (a + b)^* (aa + bb) (a + b)^*$

Example 24: Let $\Sigma = \{a, b\}$. Write regular expression to define language consisting of strings w such that, w with at the most one occurrence of sub-string bb

Solution: $r = (a + ba)^* (bb + \epsilon) (a + ab)^*$

Example 25: Let $\Sigma = \{a, b\}$. Write regular expression to define language consisting of strings

w such that, w without sub-string ab

Solution: $r = b^* a^*$

Example 26: Let $\Sigma = \{a, b\}$. Write regular expression to define language consisting of strings w such that, w without sub-string aba

Solution: $r = (a + \epsilon) (b + aa^+)^* (a + \epsilon)$

Example 27: Let $\Sigma = \{a, b\}$. Write regular expression to define language consisting of strings w such that, w in which 3rd character from right end is always a

Solution: $r = (a + b)^* a (a + b) (a + b)$

Example 28: Let $\Sigma = \{a, b\}$. Write regular expression to define language consisting of strings w such that, w always start with 'a' and the strings in which each 'b' is preceded by 'a'.

Solution: $(a + ab)^*$

Example 29: Let $\Sigma = \{a, b\}$. Write regular expression to define language consisting of strings w such that, w contains atleast one 'a'.

Solution: $(a + b)^* a (a + b)^*$

Example 30: Let $\Sigma = \{a, b\}$. Write regular expression to define language consisting of strings w such that, w contain atleast two 'a's or any number of 'b's.

Solution: $(a^* a b^* a b^*) + b^*$

Example 31: Let $\Sigma = \{a, b\}$. Write regular expression to define language consisting of strings w such that, w contain atleast one 'a' followed by any number of 'b's followed by atleast one 'c'.

Solution: $a^+ b^* c^+$

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