TUTORIAL 2
SCSJ3203 THEORY OF COMPUTER SCIENCE

Question 1

Consider the language Y = $(w + c)(oul + oo)d$. List all words for language Y.

Question 2

Let X = {a, b} and Y = {λ, ba, ab}

a) List the strings in the set XY.
b) List the strings in the set YX.
c) How many strings of length 4 are there in Y^*?
d) List the strings in the set Y^* of length 3 or less.
e) List the strings in the set X^*Y^* of length four or less?

Question 3

Consider the language S^*, where S = {aa, b}

a) How many words does this language have of length 2?
b) How many words does this language have of length 3?

(Note: length of "aa" is 2 and length of "b" is 1)

Question 4

For each of the following, write **two strings** IN the language, **two strings** that **NOT IN** in the language and give a **short description** of the language using your own word.

Languages	2 valid strings (IN)	2 invalid strings (NOT IN)	Description
$ab(a + b)^*$			
$ab(a + b)^*ba$			
$(a + b)b(a + b)^*$			
$(a(a + b)^*b) +$ $(b(a + b)^*a)$			

Question 5

Consider the regular expression $(a + b)^*a(a + b)$

a) What string is NOT in this language?
b) Write out all the words in this language with 4 or fewer letters.

Question 6

Generate all possible strings for each of the following regular expression (at least for 3 values of Kleene star * i.e: 0, 1, 2) :

a) $a(a + b)^*$
b) a^*b^*
c) $(ab)^*$

Question 7

For the alphabet $\Sigma = \{a, b\}$, give regular expression for the following languages:

a) L_1 = All strings.
b) L_2 = All strings except empty string.
c) L_3 = All strings starting with *ab*.
d) L_4 = All strings ending with *ab*.
e) L_5 = All strings that begin AND end with *ab*
f) L_6 = All strings that begin OR end with *ab*
g) L_7 = All strings that contain the substring *ab*
h) L_8 = All strings that contain the substring *ba*
i) L_9 = All strings that contain the substring *ab* or *ba*
j) L_{10} = All strings that contain the substring *ab* and *ba*
k) L_{11} = All strings containing exactly two *a*'s.
l) L_{12} = All strings containing at least two *a*'s.