# CST 229 – Assignment 1

Wilsonville, Fall 2017

For this assignment, use only the following operators: \* + ( ) | λ

Follow the format of regular expressions from the lecture.

Given ∑ = {a, b}, construct a regular expression for each of the problems #1-5 below:

1. All sentences in which **a** appears tripled, if at all. This means that every clump of **a**’s contains 3, or 6, or 9, or 12 **a**’s.

(aaa+b)\*

This solution covers all the sentences where an a appears tripled, even the case of the empty string.

1. All sentences that contain exactly three **b**’s or four **b**’s, not more.

A\*ba\*ba\*ba\*(ba)a\*

1. All sentences that end in a double letter.

(a|b)\*aa|(a|b)\*bb or (a|b)\*(aa|bb)

1. All sentences in which the total number of **a**’s is divisible by 3 no matter how they are distributed, such as **aabaabbaba**. (Assume that a sentences with no **a**’s is part of the language)

(b\*ab\*ab\*a)\*b\*

1. All sentences that do not end in a double letter.

^.\*$((a|b)\*aa|(a|b)\*bb or (a|b)\* (aa|bb))

Given ∑ = {a, b, x, y, z, i, o, u, e, c}

1. Construct a regular expression that describes all sentences that contain the five vowels in alphabetical order (**aeiou**). All sentences in the language will have at least one of all five vowels. Warning: y is not considered a vowel.

[^aeiou]\*a[^aeiou]\*e[^aeiou]\*i[^aeiou]\*o[^aeiou]\*u[^aeiou]\*

Given ∑ = {a, b, x, y, z, i, o, u, e, c}

1. Construct a regular expression that describes all sentences in which the letters are in alphabetical order (from a –z). A letter may be duplicated in an accepted sentence and an accepted sentence does not have to contain all letters. For example… In language: **aaaeexz**. Not in language: **aabaaabccz**.

[^aeiou]\*a[^aeiou]\*b[^aeiou]\*c[^aeiou]\*d[^aeiou]\*e[^aeiou]\*f[^aeiou]\*g[^aeiou]\*h[^aeiou]\*i[^aeiou]\*j[^aeiou]\*k[^aeiou]\*l[^aeiou]\*m[^aeiou]\*n[^aeiou]\*o[^aeiou]\*p[^aeiou]\*q[^aeiou]\*r[^aeiou]\*s[^aeiou]\*t[^aeiou]\*u[^aeiou]\*v[^aeiou]\*w[^aeiou]\*x[^aeiou]\*y[^aeiou]\*z^aeiou]\*aa[^aeiou]\*bb[^aeiou]\*cc[^aeiou]\*dd[^aeiou]\*ee[^aeiou]\*ff[^aeiou]\*gg[^aeiou]\*hh[^aeiou]\*ii[^aeiou]\*jj[^aeiou]\*kk[^aeiou]\*ll[^aeiou]\*mm[^aeiou]\*nn[^aeiou]\*oo[^aeiou]\*pp[^aeiou]\*qq[^aeiou]\*rr[^aeiou]\*ss[^aeiou]\*tt[^aeiou]\*uu[^aeiou]\*vv[^aeiou]\*ww[^aeiou]\*xx[^aeiou]\*yy[^aeiou]\*zz[^aeiou]\*

Given ∑ = {0,1}

1. Construct a regular expression that describes all sentences whose length is an even number (assume that sentences of length 0 have a length of even number).

(00 + 01+ 10 + 11)\*

Given ∑ = {0,1}

1. Construct a regular expression that describes all sentences whose length can be divisible by 3. (assume that sentences of length 0 can be divisible by 3.)

(1\*01\*01\*0)1\*