Assignment 2 – Lexical Analyser

SEG2106 – Software Construction

**The assignment is due on March 1 at 11:59 pm and should be submitted on the Birghtspace.**

# Question 1 – Regular Expressions (30 points)

### Find regular expressions that define the following languages:

### All even-length strings over the alphabet {a,b}.

1. All strings over the alphabet {a,b} with odd numbers of a’s.
2. All strings over the alphabet {a,b} with even numbers of b’s.
3. All strings over the alphabet {a,b} that start and end with different symbols.

### All strings over the alphabet {a, b} that do not contain the substring aab and end with bb.

### All binary numbers greater than 110011.

### All strings of the kind ISX where I is an integer number, S is a non-zero length string composed of upper-case or lower-case alphabets and X is an integer greater than 3 and less than 45. Examples: 143Smith32, or -20Charles25

# Question 2 – Non-Deterministic Finite Automata (30 points)

Convert the following regular expressions to Non-deterministic Finite Automata (NFA):

1. (b|c)\*a(a|c)\*
2. c\*|(a+|(b|c))\*b\*
3. abb(ab)\*(a\*b\*c\*)

# Question 3 – NFA to DFA Conversion (40 points)

Convert the following Non-deterministic Finite Automata (NFA) to Deterministic Finite Automata (DFA) using the subset construction algorithm. Show every ε-closure(s), ε-closure(T), and move(T,a) calculation (as we have done in class).

a)

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b)

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