Assignment 1 – CS 507 – Theory of Programming Languages – Spring 2020

Total Marks: 80 **Due: Monday, September 21, 2020 – 8 AM in Class**

Note: Late submissions will have 25% deduction. Submission after Wednesday September 16 – 5 PM will not be accepted.

1. [10*5] Give DFA for the following languages, over the alphabet {0,1}
    a. All strings that contain three consecutive 1's
    b. All strings that do not end with 00
    c. All strings with even number of 0's and odd number of 1's
    d. All strings with even number of 0's and exactly 2 1's
    e. All strings with length at least 4 and even number of 1's
    f. All strings such that every 00 is followed by a 1.
    g. All strings such that each '0' is immediately preceded and followed by a '1'
    h. All strings have 0101 as a substring
    i. All strings such that {(# 0's(w) - # 1's(w))mod 3 > 0}

    Hint for i): consider the possible number of states and transit between them. Just as we did for even/odd case.

    j. The language of all strings containing no more than one occurrence of the string aa. (the string aaa should be viewed as containing 2 occurrences of aa)

2. [15]
    In class, we discussed that languages can be divided as imperative languages, functional languages, logical languages and object-oriented.
    a. Differentiate these languages with respect to their features.
    b. Give 5 different examples of each category of languages. For example, C++ can be categorized as both imperative and object oriented language.

3. [10]
    Describe the importance of Reliability and Orthoganility in Language Evaluation Criteria? You may use examples for clarification.