Student ID :
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Automata Teory Course Quiz-1.a (2016-2017Fall)

(Please use free space for draft and fit your answer to boxes.)

1. (50*P*) Consider a system run only at Winter or Summer. Prepare this system in Regular Expression format. (You can consider each season pass as a symbol)

The system has only one symbol (let be '*a*') for each season pass. Because a year has four seasons (from Winter to Fall) and each year starts at Winter, we can generalize our solution with a $(a^4)^*$. When a year starts at Winter, the system can accept this solution or after two 'season pass'. Thus the main solution must be (aa U ε). So after generalization;

$(a^4)^*$ U $(a^4)^*aa$

2. (50*P*) Let X and Y be two binary words. If there are equal numbers of 'a's with 'b's at Y, prove that L={XY} language is not always regular.

At first, we can find a representation for a subset of the problem. For example if X is ε and Y is a^nb^n, we can accept XY as a^nb^n which known as non-regular. Otherwise, if X is at least one letter like a and Y is again a^nb^n, we can accept XY as aa^nb^n. Then, for $p = n$, regardless of how the string (s) is divided (into x, y, and z), when the third rule of Pumping Lemma is proceeded, for i=0, we will never obtain an X string which is a non ε or a Y string which has equal number of '*a*'s and '*b*'s.