Formal Languages and Compilers

1 – Verify the equivalence between the following grammars:

$S \rightarrow A\ a \mid A\ b \mid S\ b \mid a \mid b$
$A \rightarrow S\ a$

$S \rightarrow a\ A \mid b\ A \mid a \mid b$
$A \rightarrow a\ S \mid b\ A \mid b$

2 – Find a pushdown automaton accepting the strings in $\{ a^n b^m \mid 2n <= m <= 3n \}$

3 – Produce an L-attributed translation scheme equivalent to the following syntax-directed-definition:

$A \rightarrow B\ a\ C\ D$

$A.x = f(B.y, C.z)$
$C.z = g(B.x)$
$B.y = h(A.y)$
$D.z = k(A.w)$

4 – Eliminate left recursion from the following grammar and produce its predictive parsing table:

$S \rightarrow Aa \mid Bc$
$A \rightarrow aB \mid Bb$
$B \rightarrow Sc \mid a$