Problem sheet -5

1. Write suitable grammars for the given languages. Also list three valid and invalid strings for each language

   (a) $L = \{a^n b^m : n \leq m + 3\}$.

   (b) $L = \{a^n b^m : n \neq m - 1\}$.

   (c) $L = \{a^n b^m : n \neq 2m\}$.

   (d) $L = \{a^n b^m : 2n \leq m \leq 3n\}$.

   (e) $L = \{w \in \{a, b\}^* : n_a(w) \neq n_b(w)\}$.

   (f) $L = \{w \in \{a, b\}^* : n_a(v) \geq n_b(v)$, where v is any prefix of $w\}$.

   (g) $L = \{w \in \{a,b\}^* : n_a(w) = 2n_b(w) + 1\}$.

2. Find the language generated by the grammars given below

$$S \rightarrow AB|\lambda,$$
$$A \rightarrow aB,$$
$$B \rightarrow Sb.$$

3.

$$S \rightarrow aaB,$$
$$A \rightarrow bBb|\lambda,$$
$$B \rightarrow Aa.$$

4. Write suitable grammar for the following C constructs.

   Consult a book on C for formal defintions of the following constructs.

   (a) literal

   (b) for statement

   (c) if-else statement

   (d) do statement

   (e) compound statement

   (f) return statement

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