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**Problem 1**

1.  $(aa)^* (b(aa)^*)^* \text{ OR } ((aa)^* | b(bb)^*)^*$
2.  $((a|b)^* (b)) | (((a|b)(b))^* (a))$
3.  $(b | ab)^* a?$
4.  $(ab^*c) | (ba^*c) | (ac^*b) | (bc^*a) | (cb^*a) | (ca^*b)$
5. It can not be constructed.
6.  $[a-z, A-Z, 0-9]\{13,18\} @ [a-z, A-Z] \{4\} (.edu)$
- 7.

**Problem 2**

1. Java is both interpreted and compiled. The Java source code is first compiled into bytecode, which is a machine-independent code that runs on the Java Virtual Machine (JVM). The JVM then interprets the bytecode and executes the corresponding machine code.

So, in a sense, Java is compiled into an intermediate form (bytecode) and then interpreted by the JVM. However, the JVM can also use just-in-time (JIT) compilation to dynamically compile the bytecode into machine code for improved performance at runtime.

Therefore, in a broader sense, Java can be considered both compiled and interpreted, depending on the stage of the execution process and the specific implementation of the JVM.

**Problem 3**

1.  $S \rightarrow aXb \mid bXa$

$$X \rightarrow (\{a \mid b\} X) \mid \epsilon$$

2.  $S \rightarrow aSb \mid bSa \mid \epsilon$

**Problem 4**

**Problem 5**

**Problem 6**