1. (a) Describe the main phases of traditional compilers, and summarise the kinds of errors in input programs that must be dealt with in each phase. [6]

   (b) Consider the following grammar:

   $$
   \begin{aligned}
   Rexpr &\rightarrow Rterm \; '+' \; Rterm \mid Rterm \; '-' \; Rterm \\
   Rterm &\rightarrow Rterm \; Rfact \mid Rfact \\
   Rfact &\rightarrow Rfact \; '*' \mid Rprim \\
   Rprim &\rightarrow 'a' \mid 'b'
   \end{aligned}
   $$

      i. Explain why this grammar is or is not suitable for top-down parsing. [6]

     ii. Left-factor this grammar. [6]

    iii. Eliminate left-recursion from the resulting grammar. [7]