1. Start with the grammar G6 from your textbook, repeated here:

   \[
   \begin{align*}
   \text{<exp>} & ::= \text{<exp>} + \text{<mulexp>} \mid \text{<mulexp>} \\
   \text{<mulexp>} & ::= \text{<mulexp>} \ast \text{<rootexp>} \mid \text{<rootexp>} \\
   \text{<rootexp>} & ::= (\text{<exp>}) \mid \text{a} \mid \text{b} \mid \text{c}
   \end{align*}
   \]

   Please modify the grammar G6 in the following ways:

   - Add subtraction and division operators (- and /) with the customary precedence and associativity.
   - Then add a left-associative operator % between + and * in precedence.
   - Then add a right-associative operator = at lower precedence than any of the other operators.

   Please note that you need not show the intermediate grammars produced as a result of each modification specified above; just provide the final grammar that is the result of modifying G6 as specified.

2. Prove that each of the following grammars is ambiguous:

   Grammar H2a:

   \[
   \begin{align*}
   \text{<person>} & ::= \text{<woman>} \mid \text{<man>} \\
   \text{<woman>} & ::= \text{wilma} \mid \text{betty} \mid \text{<empty>} \\
   \text{<man>} & ::= \text{fred} \mid \text{barney} \mid \text{<empty>}
   \end{align*}
   \]

   Grammar H2b:

   \[
   \begin{align*}
   \text{<S>} & ::= \text{<S>} \text{<S>} \mid (\text{<S>}) \mid ()
   \end{align*}
   \]