1. Consider the following number grammar, where numbers may be octal (indicated by the suffix o) or decimal (indicated by the suffix d):

\[
\begin{align*}
  \text{based-num} & \rightarrow \text{num base-char} \\
  \text{base-char} & \rightarrow \text{o} \\
  \text{base-char} & \rightarrow \text{d} \\
  \text{num} & \rightarrow \text{num digit} \\
  \text{num} & \rightarrow \text{digit} \\
  \text{digit} & \rightarrow 0 \mid 1 \mid \ldots \mid 9
\end{align*}
\]

(a) Give an attribute grammar to determine the value of a number.
(Hint: Associate a synthesised attribute val with based-num, num and digit and an inherited attribute with base-char, num and digit.)

(b) Draw a decorated parse tree for 123o.

(c) Justify whether your attribute grammar is L-attributed or not.

(d) Can the attributes be computed during parsing in a recursive-descent parser?

(e) Give some pseudo-code for computing the attributes in a single pass over the parse tree for a number.