Problem 1: (20 points)
Since most programming languages can be used to express any algorithm, why should it matter which programming language we use to solve a programming problem? (Try arguing both that it should and that it should not matter.)

Problem 2: (10 points)
Languages such as C and Java distinguish between uppercase and lowercase in specifying identifiers. What are the pros and cons of this design decision?

Problem 3: (20 points)
Write EBNF and syntax diagram descriptions of the following:

a) A C programming language switch statement.
b) A C for loop statement
c) A Java class construct.

Problem 4: (20 points)
Given the following grammar:

\[ \begin{align*}
\langle \text{assign} \rangle & \rightarrow \langle \text{id} \rangle := \langle \text{expr} \rangle \\
\langle \text{id} \rangle & \rightarrow A \mid B \mid C \\
\langle \text{expr} \rangle & \rightarrow \langle \text{id} \rangle + \langle \text{expr} \rangle \\
& \mid \langle \text{id} \rangle \ast \langle \text{expr} \rangle \\
& \mid (\langle \text{expr} \rangle) \\
& \mid \langle \text{id} \rangle
\end{align*} \]

Can you generate parse trees for the following expressions? Explain.

a) \( A := A \ast B + (C \ast A + A) \)
b) \( B := C \ast (A \ast C + B) \)
c) \( A := A + (B + (C) + A^A) \)

Problem 5: (15 points)
Is the following grammar ambiguous?

\[ \begin{align*}
\langle S \rangle & \rightarrow \langle A \rangle \\
\langle A \rangle & \rightarrow \langle A \rangle + \langle A \rangle \mid \langle \text{id} \rangle \\
\langle \text{id} \rangle & \rightarrow a \mid b \mid c
\end{align*} \]

Problem 6: (15 points)
Given the following BNF:

\[ \begin{align*}
\langle \text{exp} \rangle & \rightarrow (\langle \text{list} \rangle) \mid A \\
\langle \text{list} \rangle & \rightarrow \langle \text{list} \rangle, \langle \text{exp} \rangle \mid \langle \text{exp} \rangle
\end{align*} \]

Can you generate a parse tree for the following expression: \(( (a, a), a, (a))\)?