1. Consider the following Context Free Grammar (CFG):

\[ S \rightarrow S + A \mid A \]
\[ A \rightarrow A \ast B \mid B \]
\[ B \rightarrow (S) \mid 1 \]

(a) Say whether the grammar is ambiguous or unambiguous.
(b) Identify the set of terminal symbols.
(c) Give parse trees for each string.
   i. 1
   ii. 1 + 1
   iii. 1 + 1 + 1
   iv. (1)

2. Give a CFG for “any number \(m\) of zeros followed by an equal number \(n\) of ones and zeros”, i.e., \(\{0^m1^n0^n \mid m, n \geq 1\}\).
   Note: We exclude the empty string from the set of acceptable strings.

3. Answer the following questions about this Turing Machine (TM):

(a) Does the TM accept the string 0011?
(b) Give the sequence of machine configurations for the string 0011.
(c) Is your sequence in (3b) a valid computation?
(d) Does the TM accept the string 00B11?
(e) Give the sequence of machine configurations for the string 00B11.
(f) Is your sequence in (3e) a valid computation?

4. Modify/complete the following TM to accept the set of strings 
   \( \{0^n, 1^n, 0^n | n \geq 1\} \).