

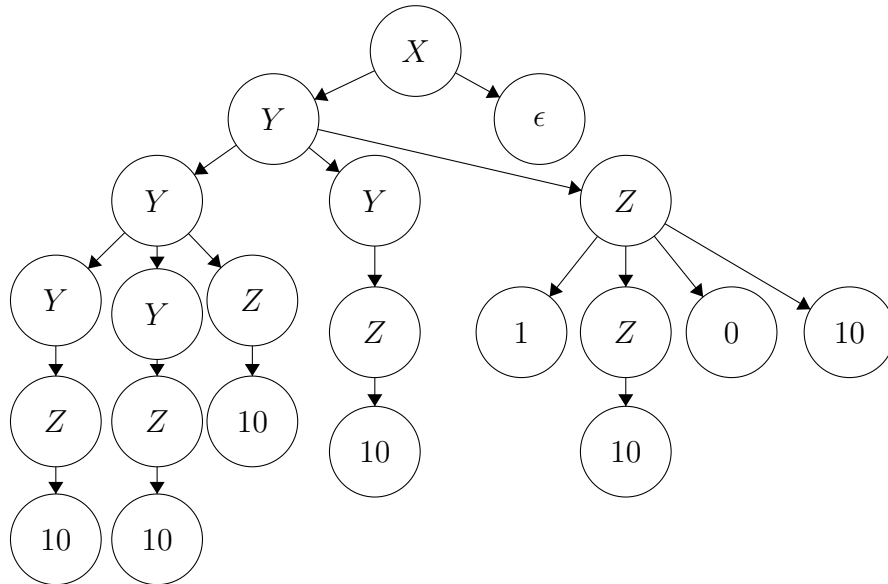
Question 1:

$G = \{V, \Sigma, S, P\}$
 $V = \{S, A, B\}$
 $\Sigma = \{x, y, z, w\}$
and P is:
 $S \rightarrow AB$
 $A \rightarrow xAy \mid \epsilon$
 $B \rightarrow zBw \mid \epsilon$

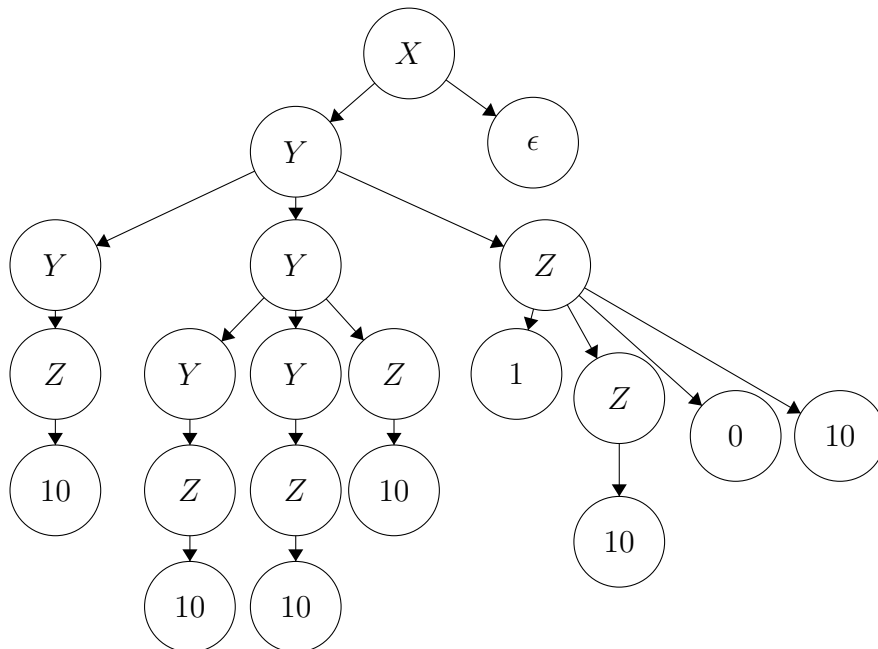
My grammar is not ambiguous since for generating any string w of the form $x^m y^m z^n w^n$ there is only one S which can be used.

Question 2:

Derivation Tree 1:



Derivation Tree 2:



A)

By Definition 2.7 in the TextBook, the grammar that uses rule set R_1 is ambiguous. It generates a string w ambiguously since it has two different leftmost derivations making the grammar ambiguous as shown above in Derivation Tree #1 and #2.

B) To show that R_2 is not ambiguous, we can take a look at the grammar's constituent parts.

$X \rightarrow Y|\epsilon$, this cannot be ambiguous, since using the left most variable always yields Y so there is no choice and therefore not ambiguous.

$Y \rightarrow ZY|Z$, there is also no ambiguity here since at a time only one can be used, unlike in R_1 where there are two Y 's leading to choices and ambiguity, so here there are no choices and therefore again no ambiguity.

$Z \rightarrow 1Z0|10$, here, again for the same reasons as above, there is no ambiguity.

Question 3:

