Name:

Student ID:

Compiler Construction, Spring 2020
Quiz 2

Given the context-free grammar, ***G***, and the string “x & x – x”, please answer the following questions.

1. Is it possible to derive more than one leftmost derivation for the string? If so, please write them down. If not, please describe your reason. (2pt)
2. Is it possible that the result derived by the rightmost derivation is identical to that by the leftmost derivation? Please write down the rightmost derivation for the string and compare it against the results in 1. (2pt)
3. Please determine if G is ambiguous grammar and explain why. (1pt)

Context-free grammar, *G*:

```
1| X -> X - X
2| X -> X & X
3| X -> x
```

Solution:

1. Yes.

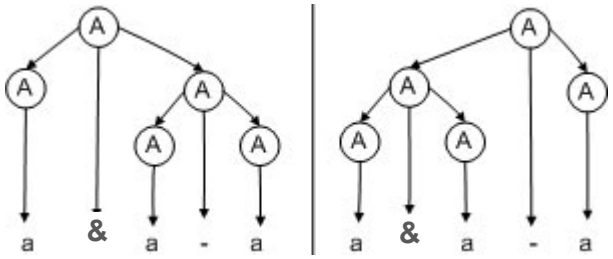
X→ X & X X→ X - X

→ x & X → X & X - X

→ x & X - X → x & X - X

→ x & x - X → x & x - X

→ x & x - x → x & x – x



2. Yes.

X→ X & X

→ X & X - X

→ X & X – x

→ X & x - x

→ x & x - x

3. Yes. It is ambiguous grammar since we can dervie two leftmost derivations (parse trees) for the given string.