Student Name: Emily Yeh

Check one:

[X] I completed this assignment without assistance or external resources.

[ ] I completed this assignment with assistance from ___

and/or using these external resources: ___

2A: All strings (over {0,1}) consisting of a substring *w* followed by its reverse.

S = 0S0 | 1S1 | ε

Derivation for 010010:

S → 0S0 → 01S10 → 010S010 → 010ε010 → 010010

2B: All strings (over {a,b,c}) of the form a^{i}b^{i}c^{j}: an equal number of as and bs, followed by any number of cs.

S1 = aS1b | ε

S2 = S2c | ε

S = S1S2

(Example) Derivation of aabbcccc:

S → S1S2→ aS1bS2c → aaS1bbS2cc → aaεbbS2ccc → aabbS2cccc → aabbεcccc → aabbcccc

2C: All strings (over {a,b,c}) of the form a^{i}b^{j}c^{j}: any number of as, followed by an equal number of bs and cs.

S1 = aS1 | ε

S2 = bS2c | ε

S = S1S2

(Example) Derivation of aaaabbcc:

S → S1S2 → aS1bS2c → aaS1bbS2cc → aaaS1bbεcc → aaaaS1bbcc → aaaaεbbcc → aaaabbcc

2D: Give two distinct grammars that produce the strings described by the regular expression (ab)*

Grammar 1:

S = Sab | ε

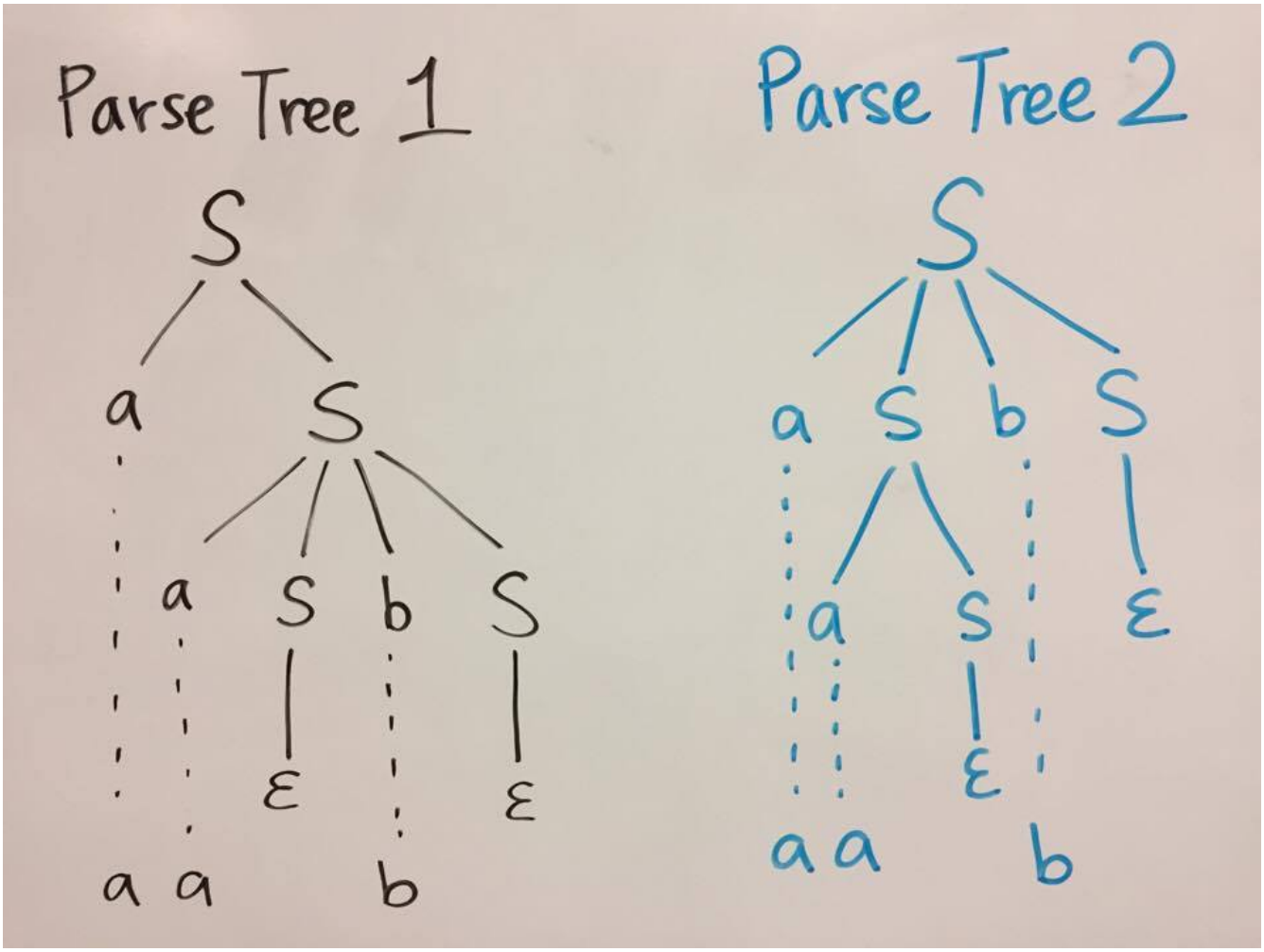
Grammar 2:

S1 = S1a | aS1 | ε

S2 = S2b | bS2 | ε

S = S1S2

4A:



4B: Leftmost derivations:

Derivation 1:

S → aS → aaSbS → aaεbS → aabε → aab

Derivation 2:

S → aSbS → aaSbS → aaεbS → aabS → aabε → aab

4C: Rightmost derivations:

Derivation 1:

S → aSbS → aSbε → aaSb → aaεb → aab

Derivation 2:

S → aS → aaSbS → aaSbε → aaεb → aab