

1.

$aA \dots, a$

$$S \rightarrow ABA$$

$$A \rightarrow aA \mid \epsilon$$

$$B \rightarrow bB \mid \epsilon$$

Remove ϵ

$$S \rightarrow \textcircled{ABA} \mid BA \mid AB \mid \textcircled{B} \mid AA \mid \textcircled{A}$$

$$A \rightarrow \textcircled{aA} \mid a$$

$$B \rightarrow \textcircled{bB} \mid b$$

$$S \rightarrow XA \mid BA \mid AB \mid b \mid AA \mid a$$

$$A \rightarrow YA \mid a$$

$$B \rightarrow zB \mid b$$

$$X \rightarrow AB$$

$$Y \rightarrow a$$

$$z \rightarrow b$$

$$S \rightarrow A_1$$

$$A \rightarrow A_2$$

$$B \rightarrow A_3$$

$$X \rightarrow A_4$$

$$Y \rightarrow A_5$$

$$z \rightarrow A_6$$

$$A_1 \rightarrow A_4 A_2 \mid A_3 A_2 \mid A_2 A_3 \mid b \mid A_2 A_2 \mid a$$

$1 < 4, 1 < 3, 1 < 2, 1 < 2$

$$A_2 \rightarrow A_5 A_2 \mid a$$

$1 < 5$

$3 < 6$

$$A_3 \rightarrow A_6 A_3 \mid b$$

$$A_4 \rightarrow A_2 A_3$$

$$A_5 \rightarrow a$$

$$A_6 \rightarrow b$$

~~$4 < 2$~~

✓

✓

$$A_4 \rightarrow A_5 A_2 A_3 \mid a A_3$$

✓

GNF

$$A_6 \rightarrow b$$

$$A_5 \rightarrow a$$

$$A_4 \rightarrow a A_2 A_3 \mid a A_3$$

$$A_3 \rightarrow b A_3 \mid b$$

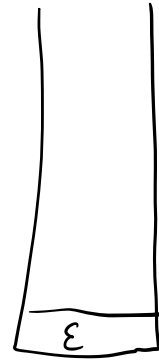
$$A_2 \rightarrow a A_2 \mid a$$

$$A_1 \rightarrow a A_2 A_3 A_2 \mid a A_3 A_2 \mid b A_3 A_2 \mid b A_2 \mid a A_2 A_3 \mid a A_3 \mid b \mid$$

$$a A_2 A_2 \mid a A_2 \mid a$$

2.

- 1 - Read 1, nothing on stack, pop nothing a_2
- 0 - Read 0, nothing on stack, pop nothing a_2
- 1 - Read 1, nothing on stack, pop nothing a_3
- 0 - Read 0, nothing on stack, pop nothing a_3
- 1 - Read 1, nothing on stack, pop nothing a_4
- 0 - Read 0, nothing on stack, pop nothing a_4



The string is accepted. Nothing is on the stack the whole time.