Übung 1

(a) $a^{n+m} b^m c^\ell d^{2n+1}$

$= a^n a^m b^m c^\ell d d^{2n}$

R:

- $S ::= \hat{(}\, a\, S\, dd \,\hat{|}\, A\, \hat{\{}\, c \,\hat{\}}\, d \,\hat{)}$
- $A ::= \hat{(}\, a\, A\, b \,\hat{|}\, a\, b \,\hat{)}$

$V = \{ S, A \}$

(b) $f(\varrho) = \begin{pmatrix} [\![\hat{[}\, aY \,\hat{]}]\!](\varrho) \\ [\![\hat{(}\, Xb \,\hat{|}\, Xbb \,\hat{)}]\!](\varrho) \end{pmatrix}$

$= \begin{pmatrix} \{\varepsilon\} \cup \{a\} \cdot \varrho(Y) \\ \varrho(X) \cdot \{b, bb\} \end{pmatrix} \quad \left(= \begin{pmatrix} f(\varrho)(X) \\ f(\varrho)(Y) \end{pmatrix} \right)$

$\begin{pmatrix} \emptyset \\ \emptyset \end{pmatrix} \overset{f}{\mapsto} \begin{pmatrix} \{\varepsilon\} \\ \emptyset \end{pmatrix} \overset{f}{\mapsto} \begin{pmatrix} \{\varepsilon\} \\ \{b, bb\} \end{pmatrix} \overset{f}{\mapsto} \begin{pmatrix} \{\varepsilon, ab, abb\} \\ \{b, bb\} \end{pmatrix}$

$\overset{f}{\mapsto} \begin{pmatrix} \{\varepsilon, ab, abb\} \\ \{b, bb, abb, abbb, abbbb\} \end{pmatrix}$

$\overset{f}{\mapsto} \begin{pmatrix} \{\varepsilon, ab, abb, a^2b^2, a^2b^3, a^2b^4\} \\ \{b, bb, abb, abbb, abbbb\} \end{pmatrix}$

(c) $\omega(\mathcal{E}) = \omega(\mathcal{E}, X)$

$X ::= \hat{[}\, a\, Y \,\hat{]}$ $\qquad$ $Y ::= (X b \,\hat{|}\, X b b)$

$\Rightarrow \quad X ::= \hat{[}\, a\, (X b \,\hat{|}\, X b b)\,\hat{]}$

$= \hat{[}\, a\, X\, (b \,|\, b b)\,\hat{]}$

$\omega(\mathcal{E}) = \{ a^n b^m \mid 2n \geq m \geq n \geq 0 \}$

Übung 3:

2 1 [3] 6 5 4
i j

2 1 [3] 6 5 4
i j

2 1 [3] 6 5 4
j i

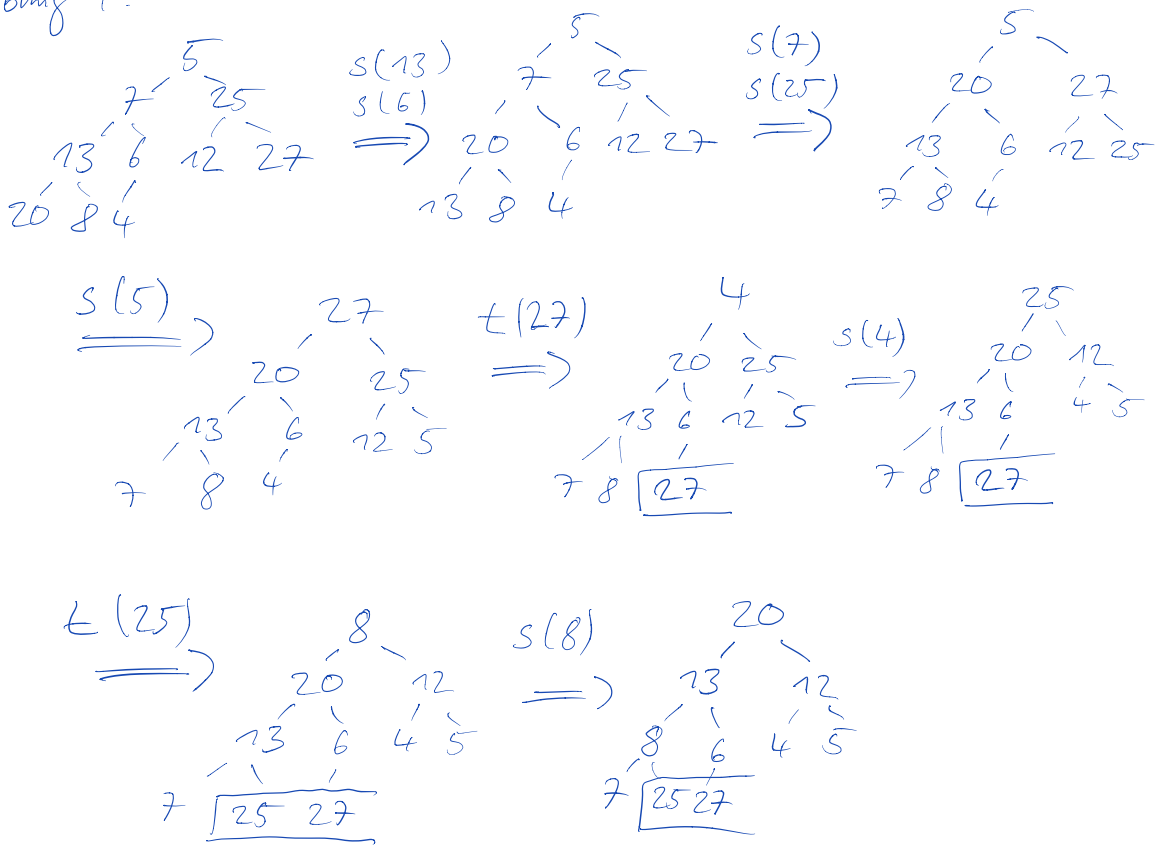
2. Durchlauf:

[2] 1 ‖ 3 ‖ 6 [5] 4
i j i j

1 [2] ‖ 3 ‖ 4 [5] 6
j i i j

4 [5] 6
j i

Übung 4:



Übung 5:

Objekt	Gültigkeitsbereich
g	3 – 36
f	5 – 36
main	28 – 36
d, e in g	18 – 26
a, b in f	5 – 16
c in f	6 – 16
w, x in main	29 – 36

Halte punkt	RM	1	2	3	4	5	6	7	8	9	10
label 7	-	m 2	n 4								
label 1	3			a #1	b #2	c 2					
label 2	3			a #1	b #2	c 3					
label 4	1,3						d 3	e #2			
label 5	1,3		3				d 3	e #2			
label 1	2,1,3								a #6	b #2	c 3
label 6	~~2~~,1,3						d 3	e #2			
label 3	~~1~~,3	3		a #1	b #2	c 3					
label 8	~~3~~	m 3	n 3								

Übung 6

a)

gewählt	Randknotenmenge
(1, 0, –)	{(2, 6, 1), (3, 2, 1), (4, 7, 1)}
(3, 2, 1)	{(2, 3, 3), (4, 6, 3), (6, 9, 3)}
(2, 3, 3)	{(4, 6, 3), (6, 9, 3), (5, 16, 2)}
(4, 6, 3)	{(7, 7, 4), (6, 9, 3), (5, 16, 2)}
(7, 7, 4)	{(6, 9, 3), (5, 16, 2), (8, 18, 7)} ⟸ (oder (6, 9, 7))
(6, 9, 3)	{(5, 12, 6), (8, 18, 7)}
(5, 12, 6)	{(8, 16, 5)}
(8, 16, 5)	∅

b) Erkennbar wenn Randknotenmenge von 7 berechnet wird.

Ziel	Pfad	Länge
1	[1]	0
3	[1, 3]	2
2	[1, 3, 2]	3
4	[1, 3, 4]	6
7	[1, 3, 4, 7]	7
6	[1, 3, 6]	9
5	[1, 3, 6, 5]	12
8	[1, 3, 6, 5, 8]	16

Ziel	Pfad	Länge
1	[1]	0
3	[1, 3]	2
2	[1, 3, 2]	3
4	[1, 3, 4]	6
7	[1, 3, 4, 7]	7
6	[1, 3, 4, 7, 6]	9
5	[1, 3, 4, 7, 6, 5]	12
8	[1, 3, 4, 7, 6, 5, 8]	16

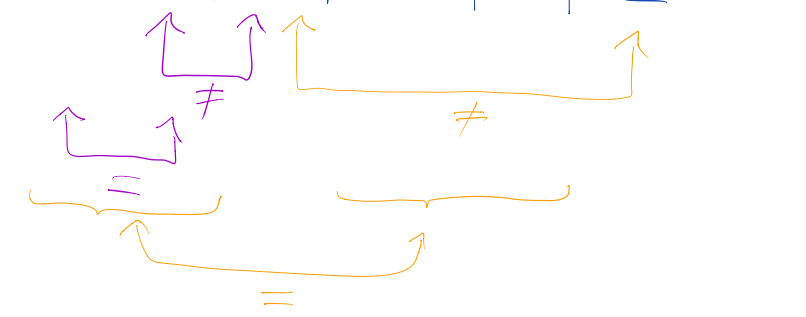
Übung 7

a)

0	1	2	3	4	5	6	7
a	a	b	a	a	a	b	b
-1	-1	1	-1	-1	2	1	3

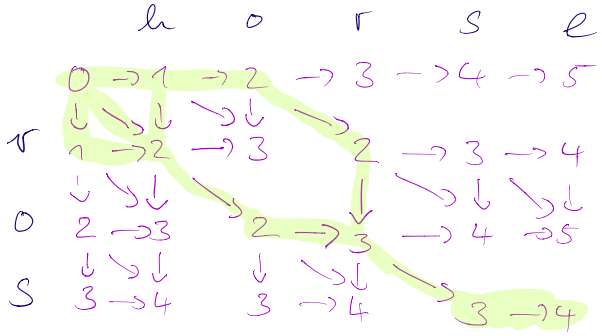
b)

0	1	2	3	4	5
b	b	a	b	b	c
-1	?	1	-1	?	2



Übung 8

a)



b) Backtraces: 4

c)