1) 48 75

1 | WWSS SW SW
2 | SWWS SWSW
3 | WWSS WSWS
4 | SWSS WWSW
5 | SSWW SWSW
6 | SWWS WSWS
7 | SWWS SWSW
8 | SWWS WSWS
9 | WWSS SWSW
10 | WWSS WSWS
11 | SSWS WWSW
12 | SWSS WWWS
13 | WWSS SWSW
14, 15, 16

2 : 2

$k = 0$ Besuchte Knoten : 1

$k = 1$ Besuchte Knoten: 1, 2, 3, 4

$k = 2$ Besuchte Knoten: 1, 2, 5, 6, 7, 3, 8, 9, 10, 4, 11, 12, 13

$k = 3$ Besuchte Knoten: 1, 2, 5, 14, 15, 16, 6
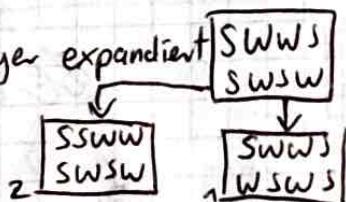
die ersten 25 Zustände.

2a) 78 Startzustand, expandiert

WWSS SWSW → SWWS SWSW (1), WWSS WSWS (2), SWSS WWSW (1)
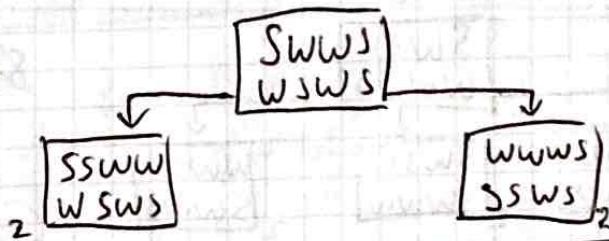
Für den Zustand des Stacks, siehe "Stackblatt" bei Punkt a) ①
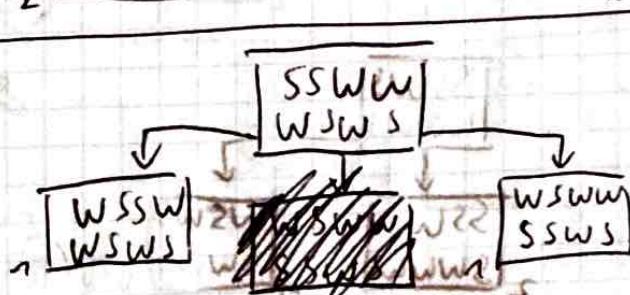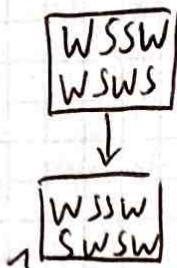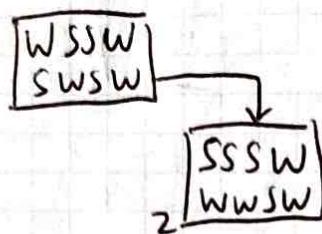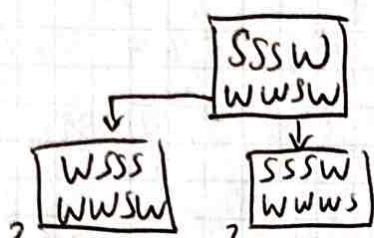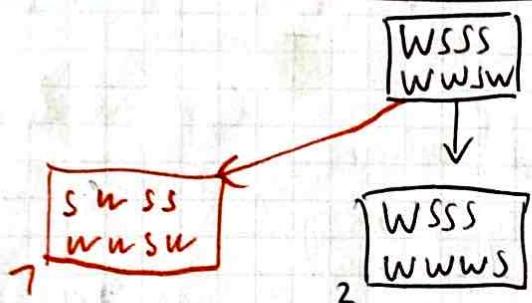
Nachfolger expandiert SWWS SWSW

SSWW SWSW (2), SWWS WSWS (1)

②

SWWS WSWS

SSWW WSWS (2), WWWS SSWS (2)

③

SSWW WSWS

WSSW WSWS (1), WSWW SSWS

④

```
        WSSW
        WSWS
          │
          ▼
        WSSW
      1 SWSW          ⑤
```

```
        WSSW
        SWSW ──────┐
                   ▼
                 SSSW
               2 WWSW          ⑥
```

```
          SSSW
          WWSW
        ┌───┴───┐
        ▼       ▼
      WSSS     SSSW
    2 WWSW   2 WWWS        ⑦
```

```
              WSSS
              WWSW
       ┌──────────┘
       ▼          ▼
   ┌ S W S S ┐   WSSS
   │ W W S W │ 2 WWWS      ⑧
   7 └───────┘
```

```
              WSSS
              WWWS
         ┌──────┴───┐
         ▼          ▼
       SWSS        WSSS
     2 WWWS      2 SWWW       ⑨
```

```
                SWSS
                WWWS
        ┌────────┼────────┐
        ▼        ▼        ▼
      SSWS      SWSS     WWSS
    2 WWWS    2 SWWW   2 SWWS     ⑩
```

```
                SSWS
                WWWS
            ┌────┴────┐
            ▼         ▼
          SSWS       WSWS
        2 SWWW     1 SWWS      ⑪
```

SIEMENS

SIEMENS

WWSW / SWSS
→ WWWS / SWSS 2
→ WWSW / SSWS 1
(18)

WWSW / SSWS
→ WWSW / SSSW 2
→ SWSW / WSWS 0
(19)

b) 15
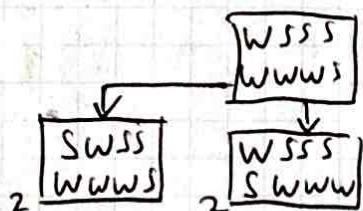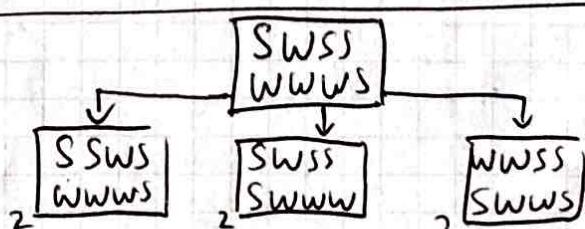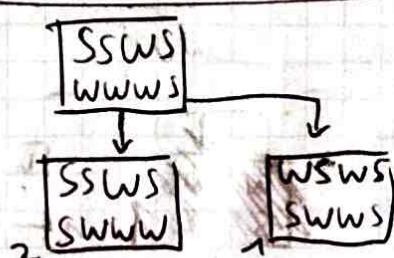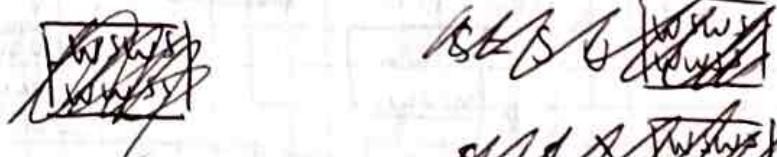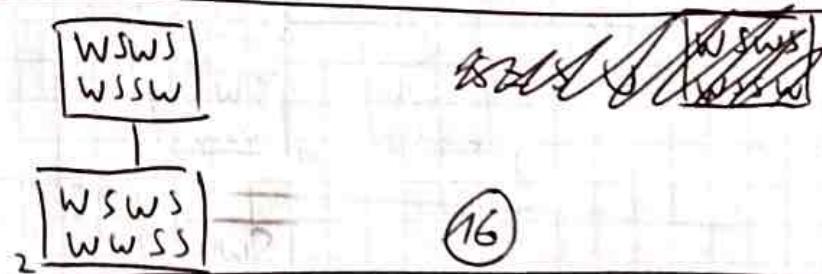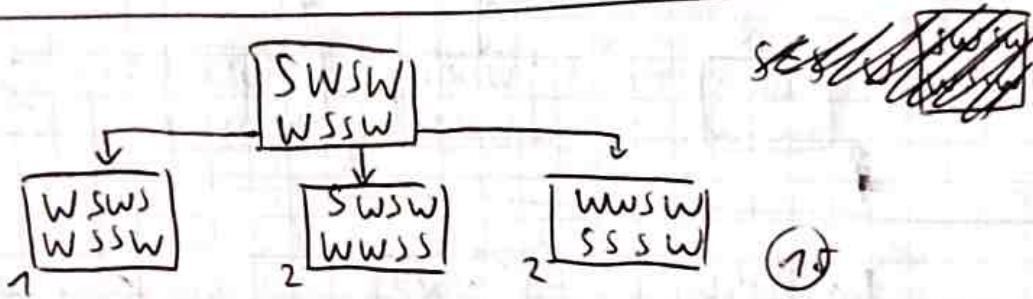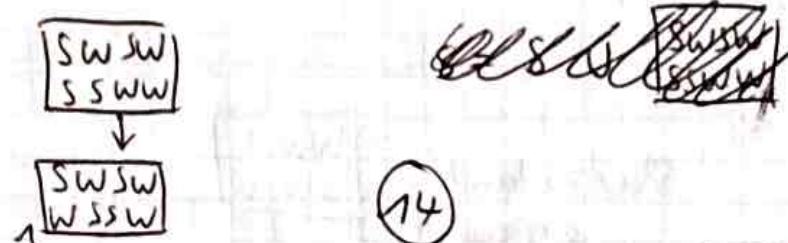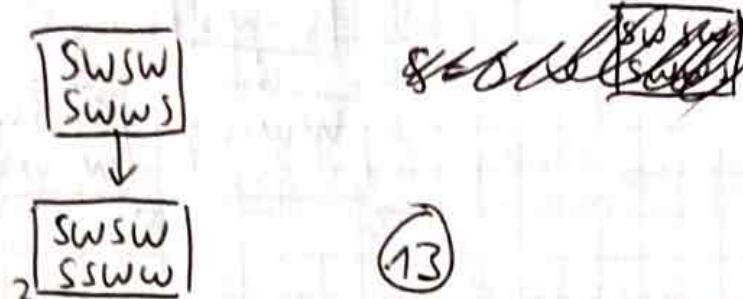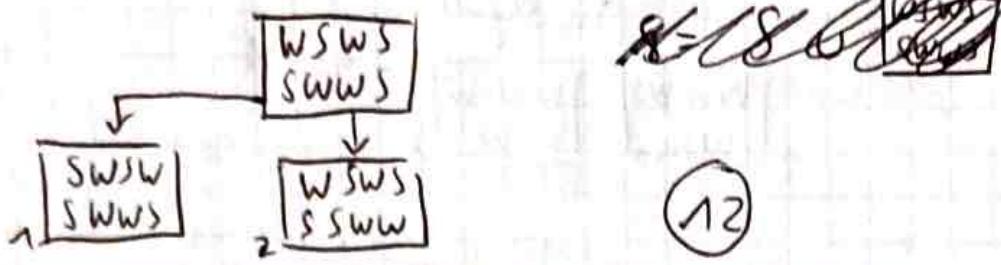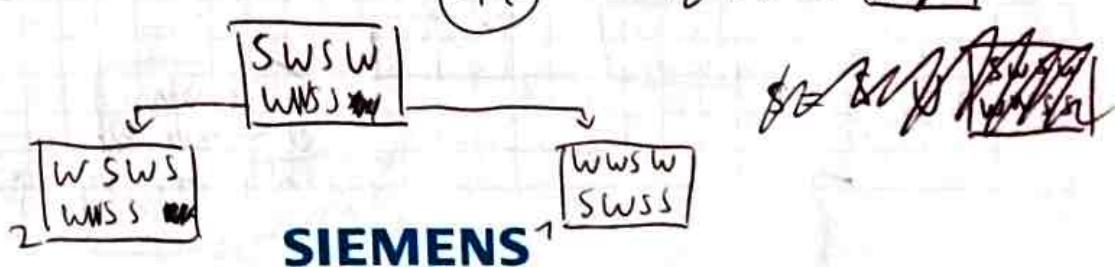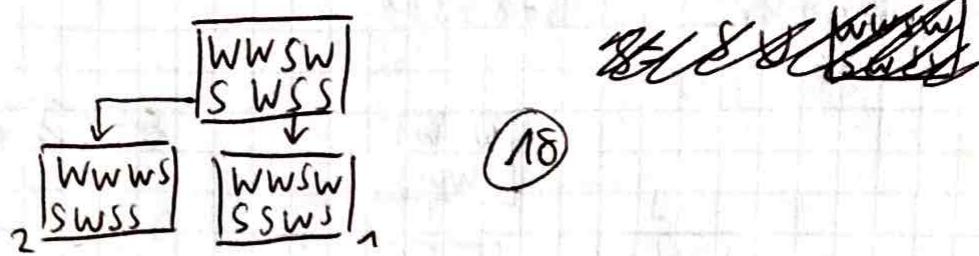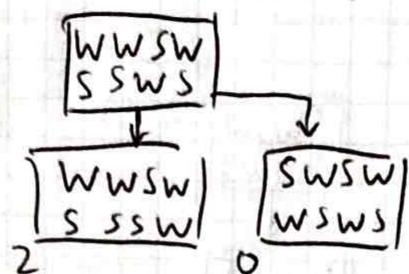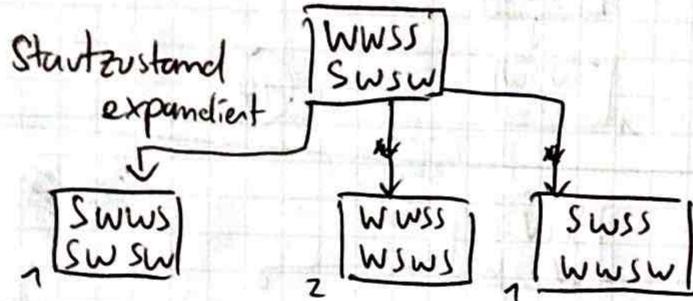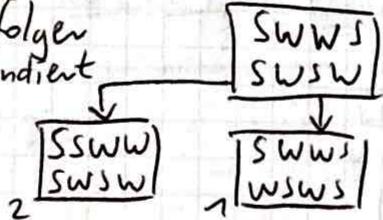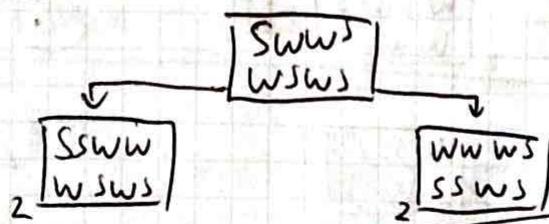
Startzustand expandiert
WWSS / SWSW
→ SWWS / SWSW 1
→ WWSS / WSWS 2
→ SWSS / WWSW 1
(1) unter b)

Nachfolger expandiert
SWWS / SWSW
→ SSWW / SWSW 2
→ SWWS / WSWS 1
(2)

SWWS / WSWS
→ SSWW / WSWS 2
→ WWWS / SSWS 2
(3)

SWSS / WWSW
→ SSWS / WWSW 1
→ SWSS / WWWS 2
(4)
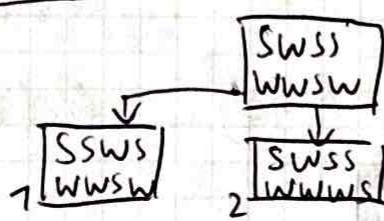
SSWS / WWSW
→ SSSW / WWSW 2
→ SSWS / WWWS 2
→ WSWS / SWSW 0
(5)
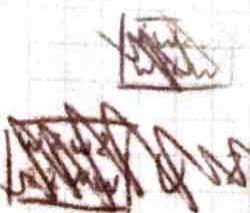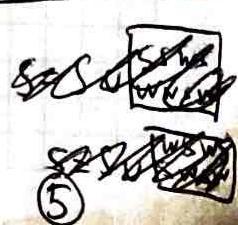
"Stackblatt"

Notation: $\frac{XXXX}{YYYY} \triangleq$ Zustand ("XXXX", "YYYY")

Im Stack liegen Tupel aus dem Zustand X und h(X).

zu 2a) ① Stack $S = \left[\left(\frac{WWSS}{SWSW}, 2\right)\right]$

nach expandieren, sortieren:

$$S = \left[\left(\frac{SWWS}{SWSW}, 1\right), \left(\frac{SWSS}{WWSW}, 1\right), \left(\frac{WWSS}{WSWS}, 2\right)\right]$$

② $S = \left[\left(\frac{SWWS}{WSWS}, 1\right), \left(\frac{SSWW}{SWSW}, 2\right), \left(\frac{SWSS}{WWSW}, 1\right), \left(\frac{WWSS}{WSWS}, 2\right)\right]$

③ $S = \left[\left(\frac{SSWW}{WSWS}, 1\right), \left(\frac{WWWS}{SSWS}, 2\right), \left(\frac{SSWW}{SWSW}, 2\right), \left(\frac{SWSS}{WWSW}, 1\right), \left(\frac{WWSS}{WSWS}, 2\right)\right]$

④ $S = \left[\left(\frac{WSSW}{WSWS}, 1\right), \left(\frac{WSWW}{SSWS}, 1\right), \left(\frac{WWWS}{SSWS}, 2\right), \left(\frac{SSWW}{SWSW}, 2\right),\right.$
$\left.\left(\frac{SWSS}{WWSW}, 1\right), \left(\frac{WWSS}{WSWS}, 2\right)\right]$

⑤ $S = \left[\left(\frac{WSSW}{SWSW}, 1\right), \left(\frac{WSWW}{SSWS}, 1\right), \left(\frac{WWWS}{SSWS}, 2\right), \left(\frac{SSWW}{SWSW}, 2\right),\right.$
$\left.\left(\frac{SWSS}{WWSW}, 1\right), \left(\frac{WWSS}{WSWS}, 2\right)\right]$

⑥ $S = \left[\left(\frac{SSSW}{WWSW}, 2\right), \left(\frac{WSWW}{SSWS}, 1\right), \left(\frac{WWWS}{SSWS}, 2\right), \left(\frac{SSWW}{SWSW}, 2\right),\right.$
$\left.\left(\frac{SWSS}{WWSW}, 1\right), \left(\frac{WWSS}{WSWS}, 2\right)\right]$

⑦ $S = \left[\left(\frac{WSSS}{WWSW}, 2\right), \left(\frac{SSSW}{WWWS}, 2\right), \left(\frac{WSWW}{SSWS}, 1\right), \left(\frac{WWWS}{SSWS}, 2\right),\right.$
$\left.\left(\frac{SSWW}{SWSW}, 2\right), \left(\frac{SWSS}{WWSW}, 1\right), \left(\frac{WWSS}{WSWS}, 2\right)\right]$

⑧ $S = \left[\left(\frac{WSSS}{WWWS}, 2\right), \left(\frac{SSSW}{WWWS}, 2\right), \left(\frac{WSWW}{SSWS}, 1\right), \left(\frac{WWWS}{SSWS}, 2\right),\right.$
$\left.\left(\frac{SSWW}{SWSW}, 2\right), \left(\frac{SWSS}{WWSW}, 1\right), \left(\frac{WWSS}{WSWS}, 2\right)\right]$

⑨ $S = \left[\left(\frac{SWSS}{WWWS \cdot W}, 2\right), \left(\frac{WSSS}{SWWW}, 2\right), \left(\frac{SSSW}{WWWS}, 2\right), \left(\frac{WSWW}{SSWS}, 1\right), \left(\frac{WWWS}{SSWS}, 2\right),\right.$
$\left.\left(\frac{SSWW}{SWSW}, 2\right), \left(\frac{SWSS}{WWSW}, 1\right), \left(\frac{WWSS}{WSWS}, 2\right)\right]$

$\left.\begin{matrix} = 2 \\ \frac{WWWS}{SSWS} \end{matrix}\right)$

(10) $S = \left[\left(\begin{smallmatrix} SSWS \\ WWWS \end{smallmatrix}, 2 \right), \left(\begin{smallmatrix} SWSS \\ SWWW \end{smallmatrix}, 2 \right), \left(\begin{smallmatrix} WWSS \\ SWWS \end{smallmatrix}, 2 \right), \left(\begin{smallmatrix} WSSS \\ SWWW \end{smallmatrix}, 2 \right), \left(\begin{smallmatrix} SSSW \\ WWWS \end{smallmatrix}, 2 \right), \right.$
$\left(\begin{smallmatrix} WSWW \\ SSWS \end{smallmatrix}, 1 \right), \left(\begin{smallmatrix} WWWS \\ SSWS \end{smallmatrix}, 2 \right), \left(\begin{smallmatrix} SSWW \\ SWSW \end{smallmatrix}, 2 \right), \left(\begin{smallmatrix} SWSS \\ WWSW \end{smallmatrix}, 1 \right), \left. \left(\begin{smallmatrix} WWSS \\ WSWS \end{smallmatrix}, 2 \right) \right]$

(11) $S = \left[\left(\begin{smallmatrix} WSWS \\ SWWS \end{smallmatrix}, 1 \right), \left(\begin{smallmatrix} SSWS \\ SWWW \end{smallmatrix}, 2 \right), \left(\begin{smallmatrix} SWSS \\ SWWW \end{smallmatrix}, 2 \right), \left(\begin{smallmatrix} WWSS \\ SWWS \end{smallmatrix}, 2 \right), \left(\begin{smallmatrix} WSSS \\ SWWW \end{smallmatrix}, 2 \right), \left(\begin{smallmatrix} SSSW \\ WWWS \end{smallmatrix}, 2 \right), \right.$
$\left(\begin{smallmatrix} WSWW \\ SSWS \end{smallmatrix}, 1 \right), \left(\begin{smallmatrix} WWWS \\ SSWS \end{smallmatrix}, 2 \right), \left(\begin{smallmatrix} SSWW \\ SWSW \end{smallmatrix}, 2 \right), \left(\begin{smallmatrix} SWSS \\ WWSW \end{smallmatrix}, 1 \right), \left. \left(\begin{smallmatrix} WWSS \\ WSWS \end{smallmatrix}, 2 \right) \right]$

(12) $S = \left[\left(\begin{smallmatrix} SWSW \\ SWWS \end{smallmatrix}, 1 \right), \left(\begin{smallmatrix} WSWS \\ SSWW \end{smallmatrix}, 2 \right), \left(\begin{smallmatrix} SSWS \\ SWWW \end{smallmatrix}, 2 \right), \left(\begin{smallmatrix} SWSS \\ SWWW \end{smallmatrix}, 2 \right), \left(\begin{smallmatrix} WWSS \\ SWWS \end{smallmatrix}, 2 \right), \left(\begin{smallmatrix} WSSS \\ SWWW \end{smallmatrix}, 2 \right), \right.$
$\left(\begin{smallmatrix} SSSW \\ WWWS \end{smallmatrix}, 2 \right), \left(\begin{smallmatrix} WSWW \\ SSWS \end{smallmatrix}, 1 \right), \left(\begin{smallmatrix} WWWS \\ SSWS \end{smallmatrix}, 2 \right), \left(\begin{smallmatrix} SSWW \\ SWSW \end{smallmatrix}, 2 \right), \left(\begin{smallmatrix} SWSS \\ WWSW \end{smallmatrix}, 1 \right), \left. \left(\begin{smallmatrix} WWSS \\ WSWS \end{smallmatrix}, 2 \right) \right]$

(13) $S = \left[\left(\begin{smallmatrix} SWSW \\ SSWW \end{smallmatrix}, 2 \right), \left(\begin{smallmatrix} WSWS \\ SSWW \end{smallmatrix}, 2 \right), \left(\begin{smallmatrix} SSWS \\ SWWW \end{smallmatrix}, 2 \right), \left(\begin{smallmatrix} SWSS \\ SWWW \end{smallmatrix}, 2 \right), \left(\begin{smallmatrix} WWSS \\ SWWS \end{smallmatrix}, 2 \right), \left(\begin{smallmatrix} WSSS \\ SWWW \end{smallmatrix}, 2 \right), \right.$
$\left(\begin{smallmatrix} SSSW \\ WWWS \end{smallmatrix}, 2 \right), \left(\begin{smallmatrix} WSWW \\ SSWS \end{smallmatrix}, 1 \right), \left(\begin{smallmatrix} WWWS \\ SSWS \end{smallmatrix}, 2 \right), \left(\begin{smallmatrix} SSWW \\ SWSW \end{smallmatrix}, 2 \right), \left(\begin{smallmatrix} SWSS \\ WWSW \end{smallmatrix}, 1 \right), \left. \left(\begin{smallmatrix} WWSS \\ WSWS \end{smallmatrix}, 2 \right) \right]$

(14) $S = \left[\left(\begin{smallmatrix} SWSW \\ WSSW \end{smallmatrix}, 1 \right), \left(\begin{smallmatrix} WSWS \\ SSWW \end{smallmatrix}, 2 \right), \left(\begin{smallmatrix} SSWS \\ SWWW \end{smallmatrix}, 2 \right), \left(\begin{smallmatrix} SWSS \\ SWWW \end{smallmatrix}, 2 \right), \left(\begin{smallmatrix} WWSS \\ SWWS \end{smallmatrix}, 2 \right), \left(\begin{smallmatrix} WSSS \\ SWWW \end{smallmatrix}, 2 \right), \right.$
$\left(\begin{smallmatrix} SSSW \\ WWWS \end{smallmatrix}, 2 \right), \left(\begin{smallmatrix} WSWW \\ SSWS \end{smallmatrix}, 1 \right), \left(\begin{smallmatrix} WWWS \\ SSWS \end{smallmatrix}, 2 \right), \left(\begin{smallmatrix} SSWW \\ SWSW \end{smallmatrix}, 2 \right), \left(\begin{smallmatrix} SWSS \\ WWSW \end{smallmatrix}, 1 \right), \left. \left(\begin{smallmatrix} WWSS \\ WSWS \end{smallmatrix}, 2 \right) \right]$

(15) $S = \left[\left(\begin{smallmatrix} WSWS \\ WSSW \end{smallmatrix}, 1 \right), \left(\begin{smallmatrix} SWSW \\ WWSS \end{smallmatrix}, 2 \right), \left(\begin{smallmatrix} WWSW \\ SSSW \end{smallmatrix}, 2 \right), \left(\begin{smallmatrix} WSWS \\ SSWW \end{smallmatrix}, 2 \right), \left(\begin{smallmatrix} SSWS \\ SWWW \end{smallmatrix}, 2 \right), \left(\begin{smallmatrix} SWSS \\ SWWW \end{smallmatrix}, 2 \right), \right.$
$\left(\begin{smallmatrix} WWSS \\ SWWS \end{smallmatrix}, 2 \right), \left(\begin{smallmatrix} WSSS \\ SWWW \end{smallmatrix}, 2 \right), \left(\begin{smallmatrix} SSSW \\ WWWS \end{smallmatrix}, 2 \right), \left(\begin{smallmatrix} WSWW \\ SSWS \end{smallmatrix}, 1 \right), \left(\begin{smallmatrix} WWWS \\ SSWS \end{smallmatrix}, 2 \right), \left(\begin{smallmatrix} SSWW \\ SWSW \end{smallmatrix}, 2 \right), \right.$
$\left(\begin{smallmatrix} SWSS \\ WWSW \end{smallmatrix}, 1 \right), \left. \left(\begin{smallmatrix} WWSS \\ WSWS \end{smallmatrix}, 2 \right) \right]$

(16) $S = \left[\left(\begin{smallmatrix} WSWS \\ WWSS \end{smallmatrix}, 2 \right), \left(\begin{smallmatrix} SWSW \\ WWSS \end{smallmatrix}, 2 \right), \left(\begin{smallmatrix} WWSW \\ SSSW \end{smallmatrix}, 2 \right), \left(\begin{smallmatrix} WSWS \\ SSWW \end{smallmatrix}, 2 \right), \left(\begin{smallmatrix} SSWS \\ SWWW \end{smallmatrix}, 2 \right), \left(\begin{smallmatrix} SWSS \\ SWWW \end{smallmatrix}, 2 \right), \right.$
$\left(\begin{smallmatrix} WWSS \\ SWWS \end{smallmatrix}, 2 \right), \left(\begin{smallmatrix} WSSS \\ SWWW \end{smallmatrix}, 2 \right), \left(\begin{smallmatrix} SSSW \\ WWWS \end{smallmatrix}, 2 \right), \left(\begin{smallmatrix} WSWW \\ SSWS \end{smallmatrix}, 1 \right), \left(\begin{smallmatrix} WWWS \\ SSWS \end{smallmatrix}, 2 \right), \left(\begin{smallmatrix} SSWW \\ SWSW \end{smallmatrix}, 2 \right), \right.$
$\left(\begin{smallmatrix} SWSS \\ WWSW \end{smallmatrix}, 1 \right), \left. \left(\begin{smallmatrix} WWSS \\ WSWS \end{smallmatrix}, 2 \right) \right]$

(17) $S = \left[\left(\begin{smallmatrix} WWSW \\ SWSS \end{smallmatrix}, 1 \right), \left(\begin{smallmatrix} WSWS \\ WWSS \end{smallmatrix}, 2 \right), \left(\begin{smallmatrix} WWSW \\ SSSW \end{smallmatrix}, 2 \right), \left(\begin{smallmatrix} WSWS \\ SSWW \end{smallmatrix}, 2 \right), \left(\begin{smallmatrix} SSWS \\ SWWW \end{smallmatrix}, 2 \right), \left(\begin{smallmatrix} SWSS \\ SWWW \end{smallmatrix}, 2 \right), \right.$
$\left(\begin{smallmatrix} WWSS \\ SWWS \end{smallmatrix}, 2 \right), \left(\begin{smallmatrix} WSSS \\ SWWW \end{smallmatrix}, 2 \right), \left(\begin{smallmatrix} SSSW \\ WWWS \end{smallmatrix}, 2 \right), \left(\begin{smallmatrix} WSWW \\ SSWS \end{smallmatrix}, 1 \right), \left(\begin{smallmatrix} WWWS \\ SSWS \end{smallmatrix}, 2 \right), \left(\begin{smallmatrix} SSWW \\ SWSW \end{smallmatrix}, 2 \right), \right.$
$\left(\begin{smallmatrix} SWSS \\ WWSW \end{smallmatrix}, 1 \right), \left. \left(\begin{smallmatrix} WWSS \\ WSWS \end{smallmatrix}, 2 \right) \right]$

Stackblatt, das zweite!

zu 2a) ⑱ $S = [\binom{wwsw}{ssws}, 1), (\binom{wwws}{swss}, 2), (\binom{wsws}{wwss}, 2), (\binom{wwsw}{sssw}, 2), (\binom{wsws}{ssww}, 2),$

$(\binom{ssws}{swww}, 2), (\binom{swss}{swww}, 2), (\binom{wwss}{swws}, 2), (\binom{wsss}{swww}, 2), (\binom{sssw}{wwws}, 2),$

$(\binom{wsww}{ssws}, 1), (\binom{wwws}{ssws}, 2), (\binom{ssww}{swsw}, 2), (\binom{swss}{wwsw}, 1), (\binom{wwss}{wsws}, 2)]$

⑲ $S = [(\binom{swsw}{wsws}, 0), (\binom{wwsw}{sssw}, 2), (\binom{wwws}{swss}, 2), (\binom{wsws}{wwss}, 2), (\binom{wwsw}{sssw}, 2), (\binom{wsws}{ssww}, 2),$

$(\binom{ssws}{swww}, 2), (\binom{swss}{swww}, 2), (\binom{wwss}{swws}, 2), (\binom{wsss}{swww}, 2), (\binom{sssw}{wwws}, 2),$

$(\binom{wsww}{ssws}, 1), (\binom{wwws}{ssws}, 2), (\binom{ssww}{swsw}, 2), (\binom{swss}{wwsw}, 1), (\binom{wwss}{wsws}, 2)]$

Zielknoten $\frac{swsw}{wsws}$ gefunden.

zu 2b) Stack $S = [(\binom{wwss}{swsw}, 2)]$

① nach expandieren, sortieren $S = [(\binom{swss}{swsw}, 1), (\binom{swss}{wwsw}, 1), (\binom{wwss}{wsws}, 2)]$

② $S = [(\binom{swws}{wsws}, 1), (\binom{swss}{wwsw}, 1), (\binom{ssww}{swsw}, 2), (\binom{wwss}{wsws}, 2)]$

③ $S = [(\binom{swss}{wwsw}, 1), (\binom{ssww}{wsws}, 2), (\binom{wwws}{ssws}, 2), (\binom{ssww}{swsw}, 2), (\binom{wwss}{wsws}, 2)]$

④ $S = [(\binom{ssws}{wwsw}, 1), (\binom{swss}{wwws}, 2), (\binom{ssww}{wsws}, 2), (\binom{wwws}{ssws}, 2), (\binom{ssww}{swsw}, 2), (\binom{wwss}{wsws}, 2)]$

⑤ $S = [(\binom{wsws}{swsw}, 0), (\binom{sssw}{wwsw}, 2), (\binom{ssws}{wwws}, 2), (\binom{swss}{wwws}, 2), (\binom{ssww}{wsws}, 2), (\binom{wwws}{ssws}, 2),$

$(\binom{ssww}{swsw}, 2), (\binom{wsws}{wsws}, 2)]$

Zielknoten $\frac{wsws}{swsw}$ gefunden

Muskelkater.