Übungsblatt 5

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Aufgabe 1

- C_1 — Vorzeichen (0 bedeutet positive Zahl, 1 bedeutet negative Zahl)
- C_2 — Betrag der Zahl ohne Nachkommastellen
- C_3 — Reziprok der Nachkommastellen

Aufgabe 2

(1) cload 1

(2) store 3 // Multiplication buffer init with 1

(3) load 1

(4) mult 3

(5) store 3 // Store partial result to buffer

(6) load 1

(7) csub 1 // Decrement factor

(8) if $C_0 = 0$ goto 11 // break

(9) store 1 // Decremented factor back to C_1

(10) goto 3 // Loop

(11) load 3 // Copy result to output, finish

(12) store 2

(13) end

(b)

- (1, 1, 3, 0, 0, ...)
- (2, 1, 3, 0, 1, ...)
- (3, 3, 3, 0, 1, ...)
- (4, 3, 3, 0, 1, ...)
- (5, 3, 3, 0, 3, ...)
- (6, 3, 3, 0, 3, ...)
- (7, 2, 3, 0, 3, ...)
- (8, 2, 3, 0, 3, ...) ($false$)
- (9, 2, 2, 0, 3, ...)
- (10, 2, 2, 0, 3, ...) ($b \leftarrow 3$)
- (3, 2, 2, 0, 3, ...)
- (4, 6, 2, 0, 3, ...)
- (5, 6, 2, 0, 6, ...)
- (6, 2, 2, 0, 6, ...)
- (7, 1, 2, 0, 6, ...)
- (8, 1, 2, 0, 6, ...) ($false$)
- (9, 1, 1, 0, 6, ...)
- (10, 1, 1, 0, 6, ...) ($b \leftarrow 3$)
- (3, 1, 1, 0, 6, ...)
- (4, 6, 1, 0, 6, ...)
- (5, 6, 1, 0, 6, ...)
- (6, 1, 1, 0, 6, ...)
- (7, 0, 1, 0, 6, ...)
- (8, 0, 1, 0, 6, ...) ($true; b \leftarrow 11$)
- (11, 6, 1, 0, 6, ...)
- (12, 6, 1, 6, 6, ...)
- (13, 6, 1, 6, 6, ...) (END)

Aufgabe 3

(a)

$$X = \mathbb{N}_0 \tag{1}$$
$$Y = \mathbb{N}_0 \tag{2}$$
$$K = \mathbb{N}_0 \times \mathbb{N}_0 \tag{3}$$
$$\alpha(n) = (1, n) \tag{4}$$
$$\tau((m, n)) = (m \cdot n, n - 1) \tag{5}$$
$$\omega((m, n)) = m \tag{6}$$
$$\sigma((m, n)) = \begin{cases} \text{true} & \text{, falls } n = 0 \\ \text{false} & \text{, sonst} \end{cases} \tag{7}$$

(b)

$$\tag{8}$$

Aufgabe 4

(a)

(1) $ba \to ab$

(2) $ca \to ac$

(3) $da \to ad$

(4) $cb \to bc$

(5) $dc \to cd$

(b)

- Eingabe und Anfang: $\underline{ca}bbacdaa$
- $a\underline{cb}bacdaa$
- $ab\underline{cb}acdaa$
- $abb\underline{ca}cdaa$

- $ab\underline{ba}ccdaa$
- $a\underline{ba}bccdaa$
- $aabbcc\underline{da}a$
- $aabbc\underline{ca}da$
- $aabb\underline{ca}cda$
- $aab\underline{ba}ccda$
- $aa\underline{ba}bccda$
- $aaabbcc\underline{da}$
- $aaabbc\underline{ca}d$
- $aaabb\underline{ca}cd$
- $aaab\underline{ba}ccd$
- $aaa\underline{ba}bccd$
- $aaaabbccd$
- $aaaabbccd$ (keine Regel angewendet, Ausgabe und Ende)

Aufgabe 5

(a)

k	φ	ψ	i	j
0	`||`	`*#`	0	1
1	`*#*`	`**`	1	2
2	`#|`	`1`	3	4
3	`*`	`|`	3	0
4	`#`	`0`	3	5
5	`|`	`1`	6	6

(b)

- Zeile = 0, Wort = `|||`, Position = 0
- Ergebnis = `*#|` goto 0
- Zeile = 0, Wort = `*#|`, Position = -1
- Ergebnis = `*#|` goto 1
- Zeile = 1, Wort = `*#|`, Position = -1
- Ergebnis = `*#|` goto 2
- Zeile = 2, Wort = `*#|`, Position = 1
- Ergebnis = `*1` goto 3
- Zeile = 3, Wort = `*1`, Position = 0
- Ergebnis = `|1` goto 3
- Zeile = 3, Wort = `|1`, Position = -1
- Ergebnis = `|1` goto 0
- Zeile = 0, Wort = `|1`, Position = -1
- Ergebnis = `|1` goto 1
- Zeile = 1, Wort = `|1`, Position = -1
- Ergebnis = `|1` goto 2
- Zeile = 2, Wort = `|1`, Position = -1
- Ergebnis = `|1` goto 4
- Zeile = 4, Wort = `|1`, Position = -1
- Ergebnis = `|1` goto 5
- Zeile = 5, Wort = `|1`, Position = 0
- Ergebnis = `11` goto 1000