

TÖL304G Forritunarmál Verkefnablað 4

1. Klárið að forrita halaendurkvæmt Scheme fall myiota miðað við eftirfarandi beinagrind. Athugið að faldaða fallið hjalp þarf að vera halaendurkvæmt.

```
;; Use: (myiota n)
;; Pre: n is an integer, n>=0
;; Value: The list of all integers i, such that
;; 0 < i <= n, í ascending order,
;; i.e. the list (1 2 ... n)
(define (myiota n)
  ;; Use: (hjalp r x)
  ;; Pre: r is an integer, 0 <= r <= n.
  ;; x is the list (r+1 r+2 ... n)
  ;; Value: The list (1 2 ... n)
  (define (hjalp r x)
    (if(= r x)
      '()
      (cons (+ r 1)(hjalp(+ r 1) x)))
    )
  (hjalp 0 n)
)
```

```
1 ;; Use: (myiota n)
2 ;; Pre: n is an integer, n>=0
3 ;; Value: The list of all integers i, such that
4 ;; 0 < i <= n, í ascending order,
5 ;; i.e. the list (1 2 ... n)
6 (define (myiota n)
7   ;; Use: (hjalp r x)
8   ;; Pre: r is an integer, 0 <= r <= n.
9   ;; x is the list (r+1 r+2 ... n)
10  ;; Value: The list (1 2 ... n)
11  (define (hjalp r x)
12    (if(= r x)
13      '()
14      (cons (+ r 1)(hjalp(+ r 1) x)))
15    )
16    (hjalp 0 n)
17  )
18
19
20 (myiota 0)
21 (myiota 5)
```

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Language: **R5RS**; memory limit: **128 MB**.

()

(1 2 3 4 5)

2. Skrifðu halaendurkvæmt Scheme fall myfoldl sem uppfyllir eftirfarandi lýsingu.

```

1 ;; Use: (myfoldl f u x)
2 ;; Pre: f is a binary funtion, i.e. a function
3 ;;       that takes two arguments of some type,
4 ;;       x=(x1 ... xN) is a list of values of
5 ;;       that type, u is a value of that type.
6 ;; Value: (f (f ...(f (f u x1) x2) ...) xN)
7 ;; Note: In other words, if we define a binary
8 ;;       operation ! with a!b = (f a b), then
9 ;;       then the value returned is the value of
10 ;;      u ! x1 ! x2 | ... ! xN
11 ;;      where we compute from left to right
12 (define(myfoldl f u x)
13   (if(null? x)
14     u
15     (myfoldl f (f u (car x)) (cdr x))))
16 )
17
18 (myfoldl - 3 '(1 2))
19 (myfoldl (lambda (a b) (cons b a)) '() '(1 2 3))

```

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0

(3 2 1)

> |

```

;; Use: (myfoldl f u x)
;; Pre: f is a binary funtion, i.e. a function
;;       that takes two arguments of some type,
;;       x=(x1 ... xN) is a list of values of
;;       that type, u is a value of that type.
;; Value: (f (f ...(f (f u x1) x2) ...) xN)
;; Note: In other words, if we define a binary
;;       operation ! with a!b = (f a b), then
;;       then the value returned is the value of
;;       u ! x1 ! x2 | ... ! xN
;;       where we compute from left to right
(define(myfoldl f u x)
  (if(null? x)

```

```
      u
      (myfoldl f (f u (car x)) (cdr x)))
    )
```

Notið föllin að ofan (myiota og myfoldl) til að skrifa tvær Scheme segðir til að reikna summu og margfeldi talnanna 1, ..., 30.

```
(myfoldl + 0 (myiota 30))
```

```
(myfoldl * 1 (myiota 30))
```

```
35
36 (myfoldl + 0 (myiota 30))
37
38 (myfoldl * 1 (myiota 30))
```

```
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465
265252859812191058636308480000000
>
```