

# Heimadæmi 5 - Hópverkefni

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1.      ;Dæmi 1
      ;; Notkun: (mulstreams x y)
      ;; Fyrir:  x er óendanlegur straumur talna,
      ;;          x=[x1 x2 x3 ...].
      ;;          y er einnig óendanlegur straumur talna,
      ;;          y=[y1 y2 y3 ...].
      ;; Gildi:  Óendanlegur straumur óendanlegra strauma
      ;;          talna sem er
      ;;          [[x1*y1 x2*y1 x3*y1 ...]
      ;;            [x1*y2 x2*y2 x3*y2 ...]
      ;;            [x1*y3 x2*y3 x3*y3 ...]
      ;;            .
      ;;            .
      ;;            .
      ;;          ]
      (define (mulstreams x y)
        ;; Notkun: hjalp
        ;; Fyrir:  y er óendanlegur straumur talna,
        ;;          y=[x1 x2 x3 ...].
        ;; Gildi:  Óendanlegur straumur af tölunni x1,
        ;;          y=[x1 x1 x1 ...].
        (define hjalp
          (cons-stream (stream-car y) hjalp)
        )
        (cons-stream (stream-binop * x hjalp) (mulstreams x (stream-cdr y)))
      )
```

Prófun:

```
> (map (lambda (x) (stream-list x 5)) (stream-list (mulstreams heil heil) 5))
((1 2 3 4 5) (2 4 6 8 10) (3 6 9 12 15) (4 8 12 16 20) (5 10 15 20 25))
```

2.

```
;Dæmi 2
;; Notkun: (squarestream s)
;; Fyrir: s er óendanlegur straumur talna,
;;       s=[x1 x2 x3 ...].
;; Gildi: Óendanlegur straumur óendanlegra strauma
;;       talna sem er
;;       [[x1*x1 x2*x1 x3*x1 ...]
;;        [x1*x2 x2*x2 x3*x2 ...]
;;        [x1*x3 x2*x3 x3*x3 ...]
;;        .
;;        .
;;        .
;;       ]
(define (squarestream s)
  ;; Notkun: (hjalp s x)
  ;; Fyrir: s er óendanlegur straumur talna,
  ;;       s=[a1 a2 a3 ...].
  ;;       x er óendanlegur straumur talna,
  ;;       x=[b1 b2 b3 ...].
  ;; Gildi: Óendanlegur straumur óendanlegra strauma
  ;;       talna sem er
  ;;       [[a1*b1 a2*b1 a3*b1 ...]
  ;;        [a1*b2 a2*b2 a3*b2 ...]
  ;;        [a1*b3 a2*b3 a3*b3 ...]
  ;;        .
  ;;        .
  ;;        .
  ;;       ]
  (define (hjalp s x)
    ;; Notkun: hjalp2
    ;; Fyrir: y er óendanlegur straumur talna,
    ;;       y=[x1 x2 x3 ...].
    ;; Gildi: Óendanlegur straumur af tölunni x1,
    ;;       y=[x1 x1 x1 ...].
    (define hjalp2
      (cons-stream (stream-car x) hjalp2))
    (cons-stream (stream-binop * s hjalp2) (hjalp s (stream-cdr x)))
  )
  (hjalp s s)
)
```

Prófun:

```
> (map (lambda (x) (stream-list x 5)) (stream-list (squarestream heil) 5))
((1 2 3 4 5) (2 4 6 8 10) (3 6 9 12 15) (4 8 12 16 20) (5 10 15 20 25))
```

```

3.      ;Dæmi 3
      ;; Notkun: (byltastraumi s)
      ;; Fyrir: s er óendanlegur straumur óendanlegra
      ;;        straua,
      ;;        s=[[x11 x12 x13 ...]
      ;;           [x21 x22 x23 ...]
      ;;           [x31 x32 x33 ...]
      ;;           .
      ;;           .
      ;;           .
      ;;           ]
      ;; Gildi: Óendanlegi straumurinn sem er
      ;;        byltingin (transpose) af s, þ.e.
      ;;        [[x11 x21 x31 ...]
      ;;         [x12 x22 x32 ...]
      ;;         [x13 x23 x33 ...]
      ;;         .
      ;;         .
      ;;         .
      ;;         ]
      (define (byltastraumi s)
        (cons-stream (stream-map stream-car s) (byltastraumi (stream-map stream-cdr s)))
      )

```

Prófun:

```

> (map (lambda (x) (stream-list x 5)) (stream-list (byltastraumi (mulstreams heil einn)) 5))
((1 1 1 1 1) (2 2 2 2 2) (3 3 3 3 3) (4 4 4 4 4) (5 5 5 5 5))

```