Note 1:

stream-enumerate-interval produces the stream (Let’s call it s):

1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20

seq produces the stream:

1, 3, 6, 10, 15, 21, 28, 36, 45, 55, 66, 78, 91, 105, 120, 136, 153, 171, 190, 210

y produces:

6, 10, 28, 36, 66, 78, 120, 136, 190, 210

z produces:

10, 15, 45, 55, 105, 120, 190, 210

Note 2: In the Racket streams implementation, when a stream is constructed the evaluations of both the car and the cdr are delayed until ‘stream-car’ and ‘stream-cdr’ are executed.

(define sum 0)

s: Does not Exist

seq: Does not Exist

y: Does not Exist

z: Does not Exist

sum is 0

(define (accum x)  
  (set! sum (+ x sum))  
sum)

s: Does not Exist

seq: Does not Exist

y: Does not Exist

z: Does not Exist

sum is 0

(define seq (stream-map accum (stream-enumerate-interval 1 20)))

s: 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20 (Stream just constructed)

seq: 1, 3, 6, 10, 15, 21, 28, 36, 45, 55, 66, 78, 91, 105, 120, 136, 153, 171, 190, 210 (Stream just constructed)

y: Does not Exist

z: Does not Exist

sum is 0

(define y (stream-filter even? seq))

s: 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20

seq: 1, 3, 6, 10, 15, 21, 28, 36, 45, 55, 66, 78, 91, 105, 120, 136, 153, 171, 190, 210

y: 6, 10, 28, 36, 66, 78, 120, 136, 190, 210 (Stream just constructed)

z: Does not Exist

sum is 6

(define z (stream-filter (lambda (x) (= (remainder x 5) 0)) seq))

s: 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20

seq: 1, 3, 6, 10, 15, 21, 28, 36, 45, 55, 66, 78, 91, 105, 120, 136, 153, 171, 190, 210

y: 6, 10, 28, 36, 66, 78, 120, 136, 190, 210 (Stream exists but not accessed yet)

z: 10, 15, 45, 55, 105, 120, 190, 210 (Stream just constructed)

sum is 10

(stream-ref y 7)

s: 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20

seq: 1, 3, 6, 10, 15, 21, 28, 36, 45, 55, 66, 78, 91, 105, 120, 136, 153, 171, 190, 210

y: 6, 10, 28, 36, 66, 78, 120, 136, 190, 210

z: 10, 15, 45, 55, 105, 120, 190, 210 (Stream exists but not accessed yet)

sum is 136

Printed Response is 136

(display-stream z)

s: 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20

seq: 1, 3, 6, 10, 15, 21, 28, 36, 45, 55, 66, 78, 91, 105, 120, 136, 153, 171, 190, 210

y: 6, 10, 28, 36, 66, 78, 120, 136, 190, 210

z: 10, 15, 45, 55, 105, 120, 190, 210

sum is 210

Printed Response is:

10, 15, 45, 55, 105, 120, 190, 210