

Linq

```

select(v, `) {
  len ← length(v)
  for n 0 len - 1
    out_n ← ` [v [
    out
}

select2(v, `) {
  len ← length(v)
  for n 0 len - 1
    out_n ← ` [v_n, n [
    out
}

r2(b, e) {
  if b > e
    return 0
  k ← 0
  for n b e
    out_k ← b + k
    k ← k + 1
  out
}

foreach(v, `) {
  select(v, `)
}

```

```

selectmany(v, `) {
  len ← length(v)
  out ← 0
  for n 0 len - 1
    tmp ← ` [v [
    if isArray(out)
      out ← stack(out, tmp)
    else
      out ← tmp
  out
}

repeat(t, c) {
  for n 0 c - 1
    out_n ← t
  out
}

```

```

where(v, `) {
  len ← length(v)
  [k n] ← [0 0]
  out ← 0
  while n < len
    if ` [v [
    out_k ← v_n
    k ← k + 1
    n ← n + 1
  out
}

where2(v, `) {
  len ← length(v)
  [k n] ← [0 0]
  out ← 0
  while n < len
    if ` [v_n, n [
    out_k ← v_n
    k ← k + 1
    n ← n + 1
  out
}

```

$v \square r2(0, 10)$

```

where(v, `(x) ← x < 4)T = [0 1 2 3]
` ← where(v, `(x) ← x > 5)
selectmany(select2(`, `(x, n) ← [n x]), `(x) ← x) =
  0 6 [
  1 7 [
  2 8 [
  3 9 [
  4 10 [

```

$repeat(2, 3)^T = [2 2 2]$

TODO:

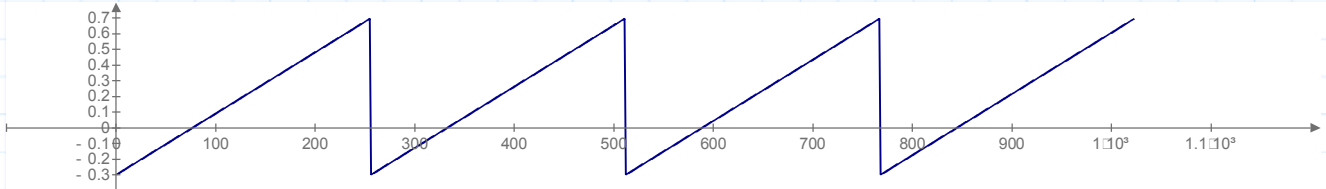
join(5), aggregate(2), aggregate(3), take(2), takewhile(2), takewhile2(2), skip(2), first(2), any(2), all(2), contains(2), count(2), batch(2), batch(3), exclude(3), takeevery(2).

$$dt = 1 \quad N = 2^{10} \quad T = N \cdot dt \quad U_0 = 1 \quad df = \frac{1}{N \cdot dt}$$

$$u1 = \text{foreach}(r2(0, \frac{N}{4} - 1), (n) \leftarrow \frac{4 \cdot n}{N} - \frac{U_0}{2} + 0.2)$$

$$u = \text{selectmany}(\text{repeat}(u1, 4), (x) \leftarrow x)$$

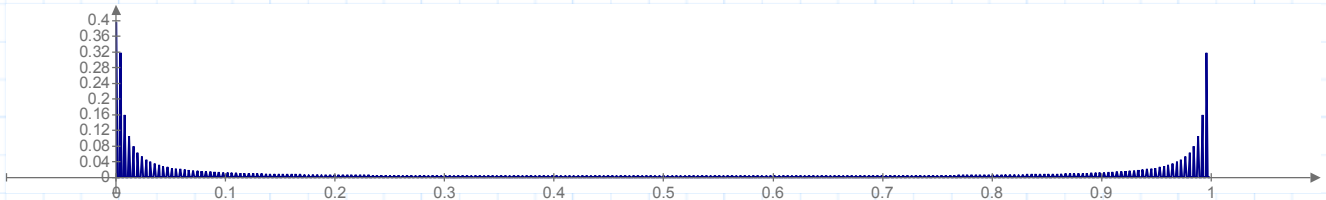
$$U = \text{augment}(\text{foreach}(r2(0, N - 1), (n) \leftarrow n \cdot dt), u)$$



U^[1]

U^[0]

$$S = \text{dft}(u) \quad G = \text{augment}(\text{foreach}(r2(0, N - 1), (n) \leftarrow n \cdot df), \frac{2}{N} \cdot |S|)$$



G^[1]

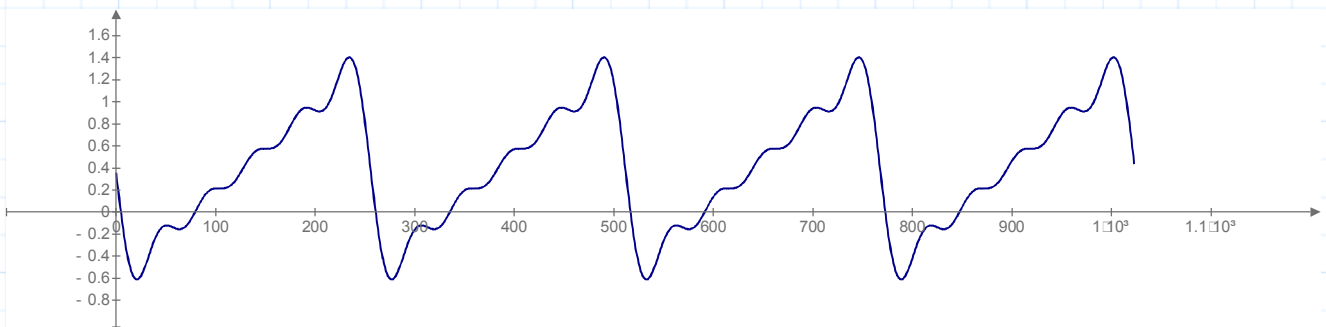
G^[0]

$$w1 = \frac{2 \cdot \pi}{N} \quad a = 2 \cdot \text{Re} \left[\frac{2}{N} \cdot S \right] \quad b = -2 \cdot \text{Im} \left[\frac{2}{N} \cdot S \right]$$

$$u(t, n) = \begin{cases} c \leftarrow \text{foreach}(r2(0, n), (k) \leftarrow a_k \cdot \cos(k \cdot w1 \cdot t) \\ s \leftarrow \text{foreach}(r2(0, n), (k) \leftarrow b_k \cdot \sin(k \cdot w1 \cdot t) \end{cases}$$

$$\frac{a_0}{2} + \sum \text{foreach}(r2(1, n), (k) \leftarrow c_k + s_k$$

$$t = 0, dt = (N - 1) \cdot dt$$



u(t, 20)

t