

```

Shekel2(m, x) := (a c) ← 
$$\begin{bmatrix} 4 & 4 & 4 & 4 \\ 1 & 1 & 1 & 1 \\ 8 & 8 & 8 & 8 \\ 6 & 6 & 6 & 6 \\ 3 & 7 & 3 & 7 \\ 2 & 9 & 2 & 9 \\ 5 & 5 & 3 & 3 \\ 8 & 1 & 8 & 1 \\ 6 & 2 & 6 & 2 \\ 7 & 3.6 & 7 & 3.6 \end{bmatrix}^T \begin{bmatrix} 0.1 \\ 0.2 \\ 0.2 \\ 0.4 \\ 0.6 \\ 0.6 \\ 0.3 \\ 0.7 \\ 0.5 \\ 0.5 \end{bmatrix}$$

O ← ORIGIN
return 
$$\left[ - \sum_{j=O}^{O+m-1} \frac{1}{c_j + \sum (x - a^{(j)})^2} \right]$$
 if 1 ≤ m ≤ 10
return error("Unknown Shekel function.")

```

Objective Function

Data:

$\alpha := 0.97$ Temperature reduction factor

$N := 4$ Size of the problem

Initial point $x_0 := 3$ $x_1 := 4$ $x_2 := 5$ $x_3 := 6$

$T_{max} := 10^2$ $T_{min} := 10^{-4}$

you had wrong indices here.
Why don't you just write $x := \text{stack}(3, 4, 5, 6)$?

Simulated Annealing Algorithm

```

otjig_nr(m) := E(x) ← Shekel2(m,x)
               T ← Tmax
               k ← 0
               while T ≥ Tmin
                 while 1
                   for i ∈ 0..N - 1
                     while 1
                       Xi ← rnorm(1, xi, √T)
                       break if (Xi ≥ 0) ∧ (Xi ≤ 10)
                     ΔE ← E(x) - E(X)
                     break if (rnd(1) < e-ΔE/T)
                   x ← X
                   k ← k + 1
                   T ← c·T
               ( x
               E(x)
               k )

```

← Function to minimize (note the order of the arguments!!!)

← result as nested matrix

$\begin{pmatrix} x5 \\ shekel5 \\ iterations5 \end{pmatrix} := \text{otjig_nr}(5)$

iterations5 = 454

$x5 = \begin{pmatrix} 3.99963 \\ 3.99928 \\ 3.99843 \\ 3.99934 \end{pmatrix}$

shekel5 = -10.15231

Shekel2(5, x5) = -10.15231

```

Shekel2(m,x) := (a c) ←  $\begin{bmatrix} 4 & 4 & 4 & 4 \\ 1 & 1 & 1 & 1 \\ 8 & 8 & 8 & 8 \\ 6 & 6 & 6 & 6 \\ 3 & 7 & 3 & 7 \\ 2 & 9 & 2 & 9 \\ 5 & 5 & 3 & 3 \\ 8 & 1 & 8 & 1 \\ 6 & 2 & 6 & 2 \\ 7 & 3.6 & 7 & 3.6 \end{bmatrix}^T \begin{bmatrix} 0.1 \\ 0.2 \\ 0.2 \\ 0.4 \\ 0.6 \\ 0.6 \\ 0.3 \\ 0.7 \\ 0.5 \\ 0.5 \end{bmatrix}$ 

O ← ORIGIN
return  $\begin{bmatrix} O+m-1 \\ - \sum_{j=O}^{O+m-1} \frac{1}{c_j + \sum (x - a^{j'})^2} \end{bmatrix}$  if 1 ≤ m ≤ 10
return error("Unknown Shekel function.")

```

Objective Function

Data:

$\alpha := 0.97$ Temperature reduction factor

$N := 4$ Size of the problem

Initial point $x_0 := 5$ $x_1 := 5$ $x_2 := 5$ $x_3 := 5$

$T_{max} := 10^2$ $T_{min} := 10^{-4}$

you had wrong indices here.
Why don't you just write $x := \text{stack}(3, 4, 5, 6)$?

Simulated Annealing Algorithm

```

otjig_nr(m) := E(x) ← Shekel2(m,x)
               T ← Tmax
               k ← 0
               while T ≥ Tmin
                 while 1
                   for i ∈ 0..N - 1
                     while 1
                       Xi ← rnorm(1, xi, √T)
                       break if (Xi ≥ 0) ∧ (Xi ≤ 10)
                     ΔE ← E(x) - E(X)
                     break if (rnd(1) < e-ΔE/T)
                   x ← X
                   k ← k + 1
                   T ← c·T
               ( x
               E(x)
               k )

```

← Function to minimize (note the order of the arguments!!!)

← result as nested matrix

$\begin{pmatrix} x5 \\ shekel5 \\ iterations5 \end{pmatrix} := \text{otjig_nr}(5)$

iterations5 = 454

$x5 = \begin{pmatrix} 4.00011 \\ 3.99975 \\ 3.99934 \\ 3.99789 \end{pmatrix}$

shekel5 = -10.15216

Shekel2(5, x5) = -10.15216