https://community.ptc.com/t5/PTC-Mathcad/slice-of-a-3D-surface/m-p/738555#M196577

$$x:=\begin{bmatrix} -7.9 & -7.9 & -7.9 & -7.9 & -7.9 & -7.9 & -7.9 & -7.9 & -7.9 & \\ -7.742 & -7.742 & -7.742 & -7.742 & -7.742 & -7.742 & -7.742 & -7.742 & -7.742 & \\ & & & & & & & & & \ddots \end{bmatrix}$$

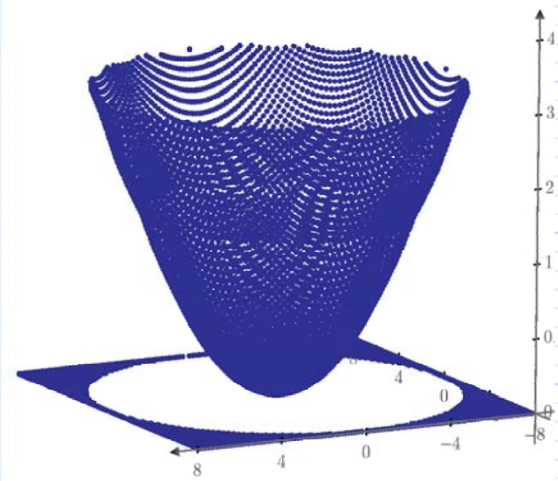
$$y:=\begin{bmatrix} -7.9 & -7.742 & -7.584 & -7.426 & -7.268 & -7.11 & -6.952 & -6.794 & -6.636 & \\ -7.9 & -7.742 & -7.584 & -7.426 & -7.268 & -7.11 & -6.952 & -6.794 & -6.636 & \\ & & & & & & & & & \ddots \end{bmatrix}$$

$$z:=\begin{bmatrix} \vdots & & & & \\ 0 & -3.646 & -3.54 & -3.427 & \\ 0 & -3.662 & -3.557 & -3.445 & \\ & & & & \ddots \end{bmatrix}$$

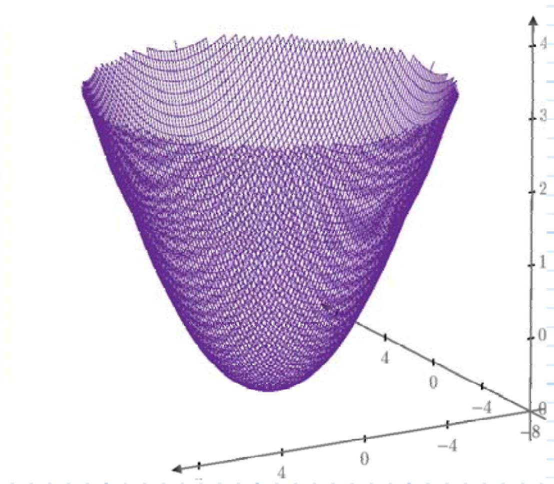
$$data:=\begin{bmatrix} x \\ y \\ -z \end{bmatrix} \qquad data_0:=\begin{bmatrix} x \\ y \\ -z_0 \end{bmatrix}$$

```
z0 := | for i ∈ 0 .. 100
      |   for j ∈ 0 .. 100
      |     if z_{i,j} = 0
      |       z_{i,j} ← NaN
      | return z
```

```
Z(p, d) := | for i ∈ 0 .. 100
           |   for j ∈ 0 .. 100
           |     if z_{i,j} > p − d ∧ z_{i,j} < p + d
           |       z_{i,j} ← p
           |     else
           |       z_{i,j} ← NaN
           | return z
```



data



$data_0$

$$x\_interp:=\text{submatrix}\left(data_0, 0, \text{rows}\left(data_0\right)-1, 0, 0\right)$$

$$y\_interp:=\text{submatrix}\left(data_1, 0, 0, 0, \text{cols}\left(data_1\right)-1\right)^{T}$$

$$coeff:=\text{pspline}\left(\text{augment}\left(x\_interp, y\_interp\right), data_2\right)$$

$$func(x,y):=\text{interp}\left(coeff, \text{augment}\left(x\_interp, y\_interp\right), data_2, \begin{bmatrix} x \\ y \end{bmatrix}\right)$$

```
linterp_2D(A, B, Data, a, b) := | O ← ORIGIN
                                | for col ∈ O .. cols(Data) − 1
```

Data ... *n* x *m* matrix
A ... vector of row headers of **Data.**

$$tmp_{col} \leftarrow \text{linterp}\left(A, Data^{\langle col \rangle}, a\right)$$

$$\text{return linterp}\left(B, tmp, b\right)$$

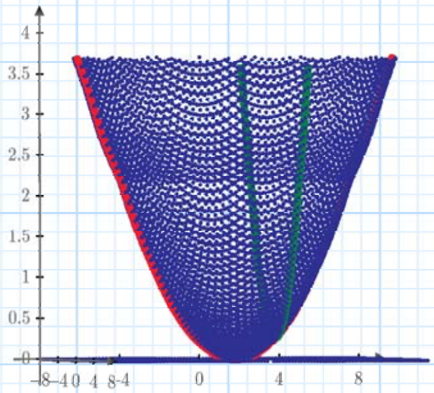
rows(**A**) = *n*

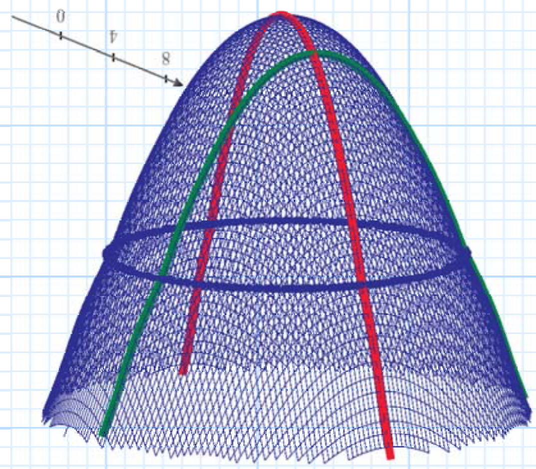
B ... vector of column headers of **Data**, **rows**(**B**) = *m*

$$func(x,y) := linterp\_2D\left(x\_interp, y\_interp, data_2, x, y\right)$$

$$slice\_x(x) := \begin{array}{l} edge \leftarrow \dfrac{15.8}{2} \\ n \leftarrow 200 \\ \text{for } i \in 0..n-1 \\ \quad \begin{array}{l} r \leftarrow -edge + \dfrac{i}{n-1} \cdot (2 \cdot edge) \\ m1 \leftarrow func(x, r) \\ mm^{\langle h \rangle} \leftarrow \text{stack}(x, r) \\ h \leftarrow h+1 \end{array} \\ mm^{\mathrm{T}} \end{array}$$

$$slice\_y(y) := \begin{array}{l} edge \leftarrow \dfrac{15.0}{2} \\ n \leftarrow 200 \\ \text{for } i \in 0..n-1 \\ \quad \begin{array}{l} r \leftarrow -edge + \dfrac{i}{n-1} \cdot (2 \cdot edge) \\ m1 \leftarrow func(r, y) \\ mm^{\langle h \rangle} \leftarrow \text{stack}(r, y) \\ h \leftarrow h+1 \end{array} \\ mm^{\mathrm{T}} \end{array}$$





data

$$\begin{bmatrix} slice\_x(0)^{\langle 0 \rangle} \\ slice\_x(0)^{\langle 1 \rangle} \\ \overrightarrow{func\left(slice\_x(0)^{\langle 0 \rangle}, slice\_x(0)^{\langle 1 \rangle}\right)} \end{bmatrix}$$

$$\begin{bmatrix} slice\_y(2)^{\langle 0 \rangle} \\ slice\_y(2)^{\langle 1 \rangle} \\ \overrightarrow{func\left(slice\_y(2)^{\langle 0 \rangle}, slice\_y(2)^{\langle 1 \rangle}\right)} \end{bmatrix}$$

$data_0$

$$\begin{bmatrix} slice\_x(0)^{\langle 0 \rangle} \\ slice\_x(0)^{\langle 1 \rangle} \\ \overrightarrow{func\left(slice\_x(0)^{\langle 0 \rangle}, slice\_x(0)^{\langle 1 \rangle}\right)} \end{bmatrix}$$

$$\begin{bmatrix} slice\_y(2)^{\langle 0 \rangle} \\ slice\_y(2)^{\langle 1 \rangle} \\ \overrightarrow{func\left(slice\_y(2)^{\langle 0 \rangle}, slice\_y(2)^{\langle 1 \rangle}\right)} \end{bmatrix}$$

$$\begin{bmatrix} x \\ y \\ -Z(-2.2, 0.05) \end{bmatrix}$$