PI Calculation - Graph

This document describes the Monte Carlo Method of Pi number approximation that we have used to demonstrate the parallel processing within MatDeck.The idea is to create randomly generated points inside the square using uniform distribution, to check which of them are inside the circle and which are inscribed in the square. Then we use the ratio of the total number of points and the number of points in the circle to approximate the Pi number. An explanation of this approximation equation is presented in the canvas below.

```
calcPi(npoints)
{
    b := matrix allocate(npoints , 2)
    for(i := 0 , i < npoints , i += 1)
    {
        xcord := randnum(-1 , 1)
        ycord := randnum(-1 , 1)
        ii := i + npoints
        b[i] := xcord
        b[ii] := ycord
    }
    return(b)
}
```

a := 100

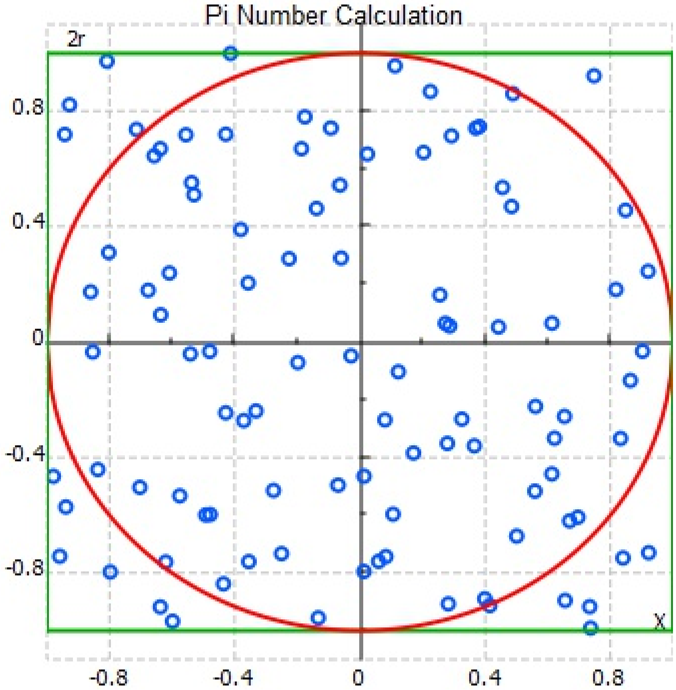
x := static value("x" , calcPi(a))

set static value("x" , x)

$$b1 := \begin{bmatrix} -1 & 1 \\ 1 & 1 \end{bmatrix} \quad b2 := \begin{bmatrix} -1 & 1 \\ -1 & -1 \end{bmatrix} \quad b3 := \begin{bmatrix} 1 & 1 \\ -1 & 1 \end{bmatrix} \quad b4 := \begin{bmatrix} -1 & -1 \\ -1 & 1 \end{bmatrix}$$

$$a1 := \text{curve2d}\left(\text{sqrt}\left(1 - z^2\right), -1, 1, 300\right)$$

$$a2 := \text{curve2d}\left(-\text{sqrt}\left(1 - z^2\right), -1, 1, 300\right)$$



Area of square

$$A_{square} := (2\ r)^2$$

Area of circle

$$A_{circle} := \pi \cdot r^2$$

Ratio between area of circle and area of square

$$A_{circle} \,/\, A_{square} = \pi / 4$$

Pi number approximation formula

$$\pi = 4 \cdot A_{circle} \,/\, A_{square}$$

Increasing the number of points generated, improves the approximation.