

calculate Pi

built-in

Notice: always check is there any built-in function first

```
% doc('num2str')  
disp(num2str(pi, 15))
```

3.14159265358979

Liu Hui's method

Wiki: https://en.wikipedia.org/wiki/Liu_Hui%27s_%CF%80_algorithm

L_n : side length of n-polygons $2 - L_{2n}^2 = \sqrt{2 + 2 - L_n^2}$

h_n : height for each triangle in n-polygons $h_n = \sqrt{1 - \frac{L_n^2}{4}}$

S_n : area of n-polygons $S_n = \frac{1}{2} n L_n h_n \approx \pi$

denote $x_n = 2 - L_n^2$

$x_6 = 1$

$x_{2n} = \sqrt{2 + x_n}$

$\pi \approx S_n = \frac{1}{4} n \sqrt{4 - x^2}$

```
%not available before 20180927
```

```
n, my_pi =      12,  3.000000000000001  
n, my_pi =      24,  3.105828541230247  
n, my_pi =      48,  3.132628613281242  
n, my_pi =      96,  3.139350203046893  
n, my_pi =     192,  3.141031950890367  
n, my_pi =     384,  3.141452472285344  
n, my_pi =     768,  3.141557607912925  
n, my_pi =    1536,  3.141583892159359  
n, my_pi =    3072,  3.141590463278451  
n, my_pi =    6144,  3.141592105876295
```

Buffon's Needle Problem (Monte Carlo Simulation)

Wiki: <https://e>

[n.wikipedia.org/wiki/Buffon%27s_needle](https://en.wikipedia.org/wiki/Buffon%27s_needle)

TODO: add explanation

%not availabel before 20180927

3.16005688102386

Series expansion

Wiki: https://en.wikipedia.org/wiki/Leibniz_formula_for_%CF%80

TODO: add explanation

%not availabel before 20180927

3.14149265359003