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# MonteCarloPi.py

"""
This module estimates pi by simulating a dart throw
game.
A large number of darts are thrown at a square with vertices
(1,-1), (1,1),(-1,1) and
(-1,-1). The darts land anywhere
in the square with equal probability. If the dart lands
inside
the unit circle we call that a "hit". For a large number of throws
N, the
the ratio of hits to throws should approximately equal
the ratio of the area of the circle to
the area of the square.
Thus  $\pi/4$  should approximately equal hits/N.
"""

#
What we need from the standard module random
from random import uniform as randu
from random
import seed

N = 1000000    # Number of darts to throw
seed(0)        # For repeatability of
experiments
Hits = 0
for throws in range(N):
    # Generate and check the k-th dart throw

    x = randu(-1,1)
    y = randu(-1,1)
    if x**2 + y**2 <= 1 :
        # Inside the unit
circle
        Hits += 1
piEst = 4*(float(Hits)/float(N))
print '\nTotal number of dart
throws = %ld' % N
print 'Pi Estimate   = %7.5f' % piEst

```