Problem Sheet 1

Problem 1: Estimating π with error analysis

Implement the two-dimensional version of determining π, discussed in the lecture, in your favorite programming language. In particular, find the call to the random number generator, and how you can adjust its "seed" (an integer), providing distinct sequences of pseudo-random numbers. Hint: in `Python` you can use

```
import random
from random import random as rnd
random.seed(1234)
r = rnd() # gives a uniformly distrbuted random number on [0,1)
```

a) Run the simulation with a number of different total sample points N. Can you confirm that the error scales as $1/\sqrt{N}$?

b) Is the difference of your results and the true value compatible with the estimate we had argued from Poisson statistics? Does this depend on N?

c) Run the simulation with different seeds and make a histogram of the estimates you obtain, also for different N. What can we conclude from this distribution?