

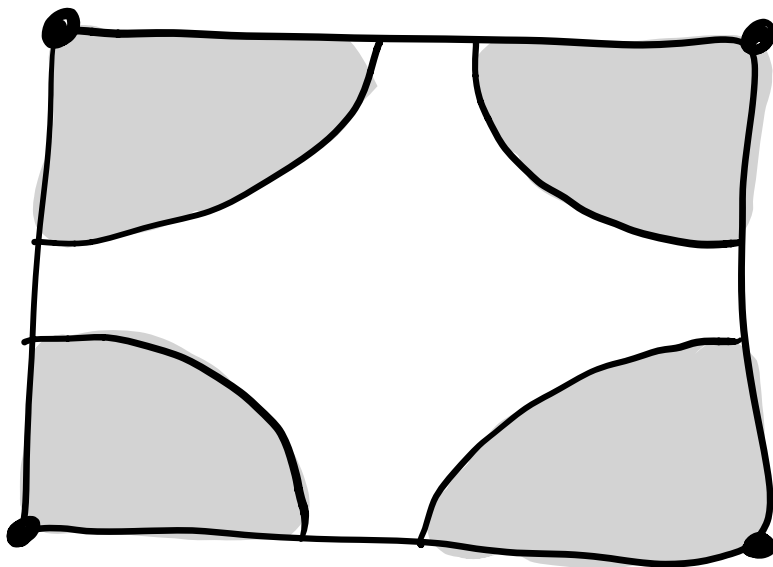
A point is chosen at random within the square with vertices $(0,0)$, $(2020,0)$, $(2020,2020)$ and $(0,2020)$

The probability that the point is within d units of a lattice point is $\frac{1}{2}$.

What is d to the nearest tenth?

A) 0.3 B) 0.4 C) 0.5 D) 0.6 E) 0.7

Consider a 1×1 block



Corners = lattice points

Shaded regions = circles of rad d around the lattice points

Area covered by circles = 0.5

(probability of being within dist d of a lattice point is 0.5)

$$\text{So } \pi d^2 = \frac{1}{2} \Rightarrow d^2 = \frac{1}{2\pi}$$

$$\Rightarrow d = \frac{1}{\sqrt{2\pi}} \approx 0.4$$

Note must have $d < 0.5$
Since otherwise the probability
is greater than $1/2$

Hence our above diagram with no overlap
of circles is valid

↑
could estimate
with $\pi \approx 3$.