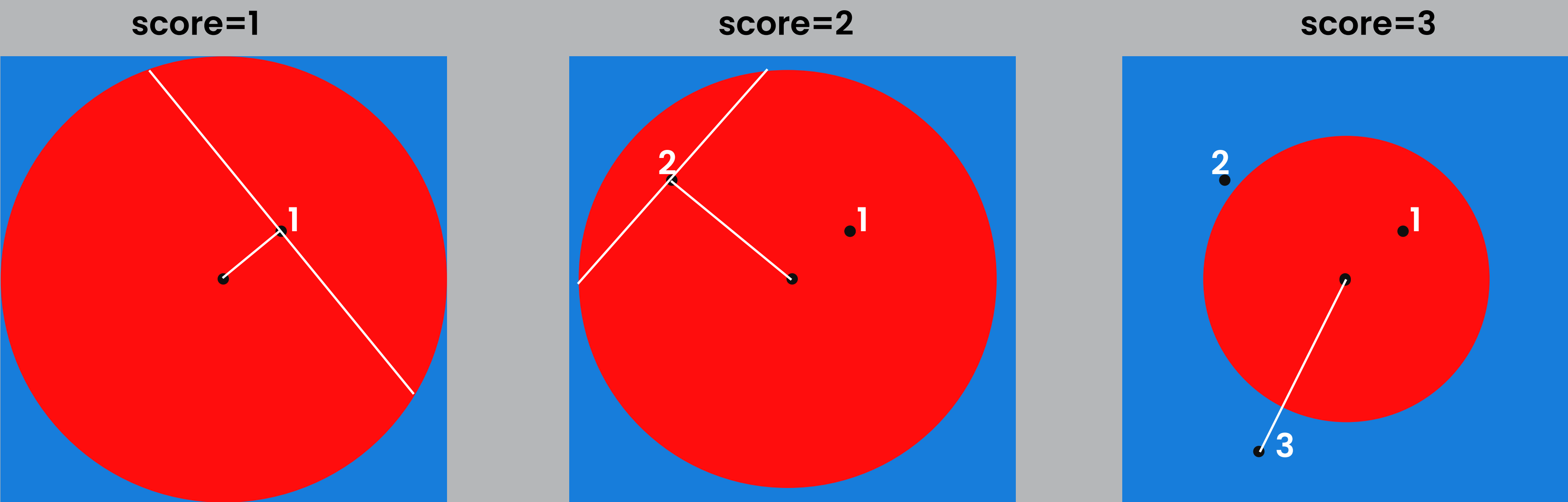


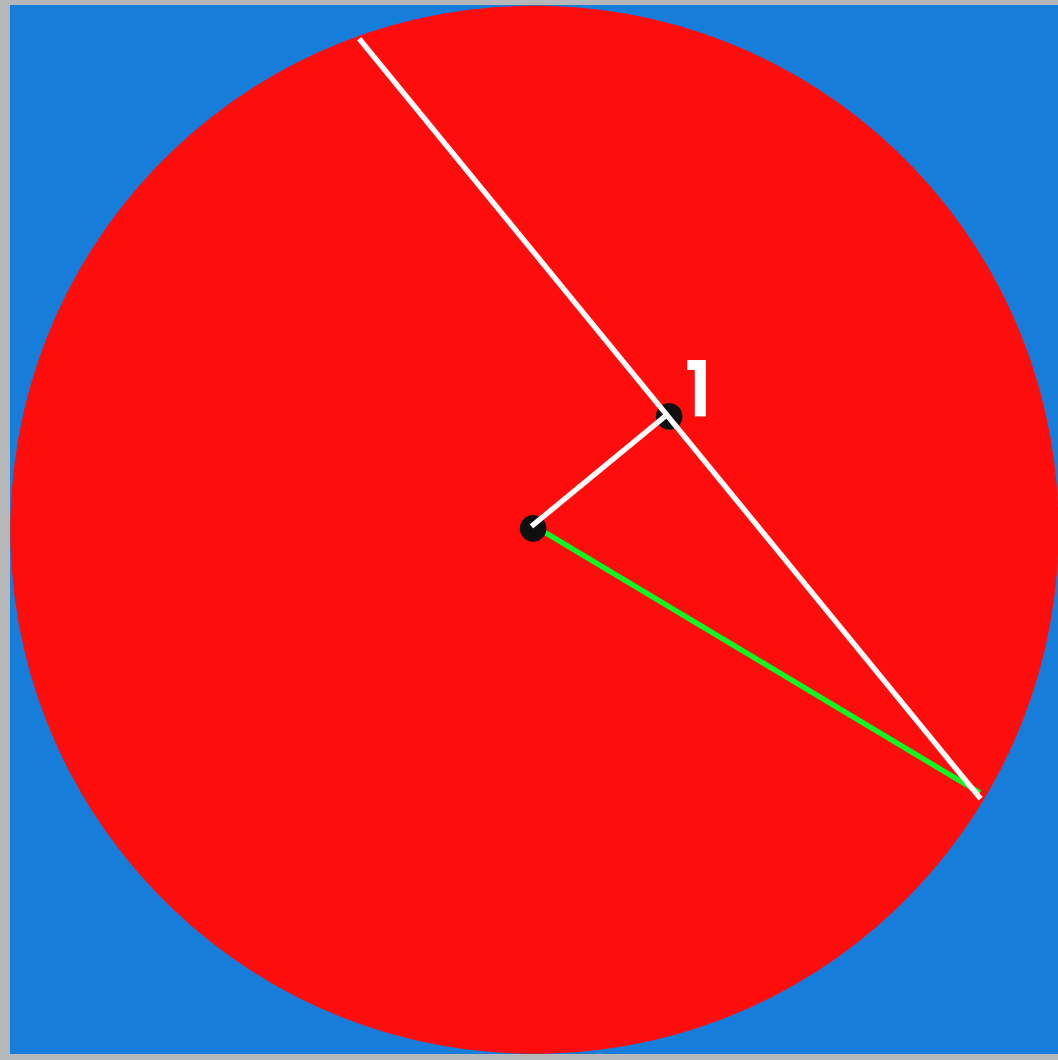
Dart Game higher dimension by Belhaj Ayman

1-Example of the Game



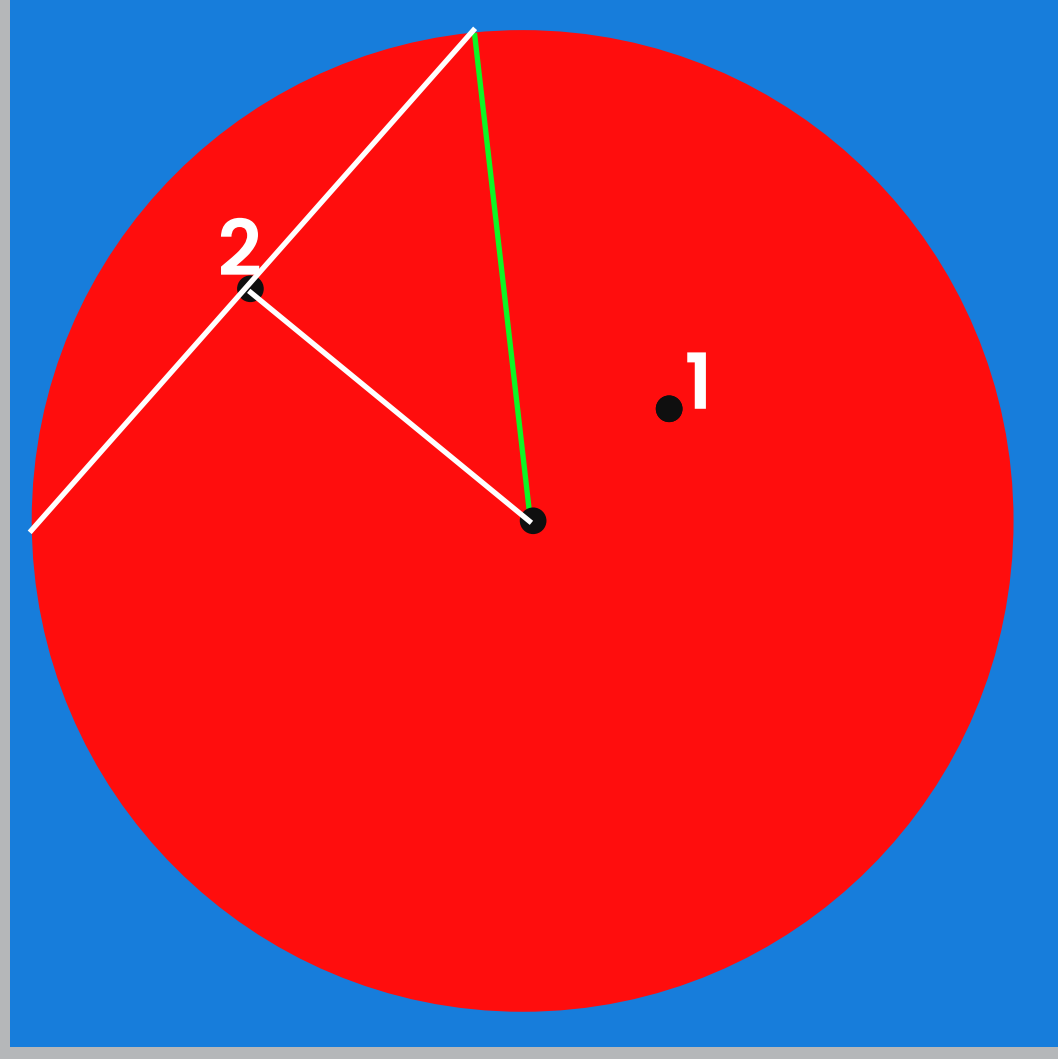
2-explaining the algorithme of the game

- . the points are geenerated uniformly between $[-1,1] \times [-1,1]$
- . we we targeting every step to understand the algo
- . the points are geenerated uniformly between $[-1,1] \times [-1,1]$
- . step 1:



$R0=1$
 $h0=\sqrt{x0^{**2}+y0^{**2}}$
the step 1 is valide because $h0<R0$ $x0^{**2}+y0^{**2} < 1$
 $R1=\sqrt{1-h0^{**2}}$
the propabilite that the point be in circle is the area
if the circle by area of rectangle which is $\pi/4$

- . step 2:



$R1=\sqrt{1-h0^{**2}}$
 $h1=\sqrt{x0^{**2}+y0^{**2}}$
the step 2 is valide because $h1<R1$
 $x0^{**2}+y0^{**2}+x1^{**2}+y1^{**2} < 1$
 $R2=\sqrt{R1-h1^{**2}}$
the propabilite that the point be in circle in the step
2 is is the area of 4 dimension bull by 4 dimension
cube

.in n step we have $x0^{**2}+y0^{**2}+.....+xn^{**2}+yn^{**2}<1$ so the propabilite the
heat the score is the area of 2n dimension bull by 2n dimension of cube

.we know the the area of 2n dimension cube is $(a)^{**2n}$

.we know the the area of 2n dimension cube is $[(\pi)^{**n}]/n!$

.Know we will estimate the score by using the esperance

$E[s]=1 \cdot P(s=1)+2 \cdot P(s=2)+.....$
 $=1 \cdot [P(s>0)-P(s>1)]$
 $+2 \cdot [P(s>1)-P(s>2)]$
 $=P(s>0)+P(s>1)+.....$

$E[s]=1+(\pi/4)+[(\pi/4)^{**2}]/2!+[(\pi/4)^{**3}]/3!+.....+[(\pi/4)^{**n}]/n!$
 $=\exp(\pi/4)=2.19...$

.so the score of this game converge to $\exp(\pi/4)$
.so the score of this game converge to $\exp(\pi/4)$

3-example of this convergence with python
programmed by Belhaj Ayman

