How to approximate Pi

I.Introduction:

P=Perimeter
r=rayon
$\pi = P/2r$

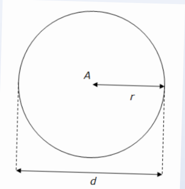
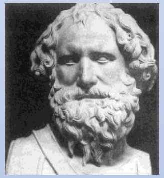


Fig. 1.1 : a circle

But how to approximate π ?
2 methods

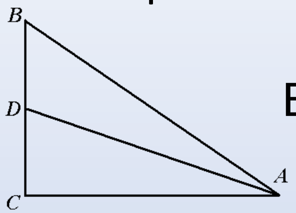


Archimedes 250 BC.
Geometric method

Buffon 1733
Statistical method

II. First method with polygon:

Approximate π with the perimeter of polygon



Bisector property
BD / CD = BA / AC

Fig. 2.1 : AD bissects BÂC

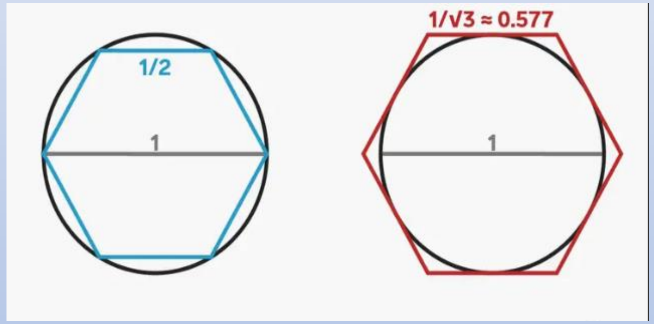
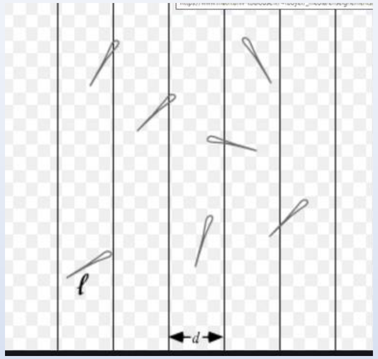


Fig. 2.2Inscribed and circumscribed hexagons in the unit circle

$$3 < \pi < 3.46$$

Polygon's Perimeter ≈ π

III. A second method with probability



l=needle's length
d=lath width
P=probability of a needle fall on the cut (break) between two laths

Results : Georges Louis Leclerc de Buffon showed that p = (2l/pi*d)

Find pi approximation :
-Throw n needles on the laths
-Call S the number of needles which cut the laths
- $p \approx \frac{s}{n}$

Here π is approximately equal to 2,675

IV. Conclusion

Buffon did his experiment with 2048 launches and found a value of Pi with a precision of 2 decimals.

For the Archimedes' method, a 96-sided polygon give a value of pi with 2 decimals.

V. References

https://www.pcworld.com/article/191389/a-brief-history-of-pi.html

https://itech.fgcu.edu/faculty/clindsey/mhf4404/archimedes/