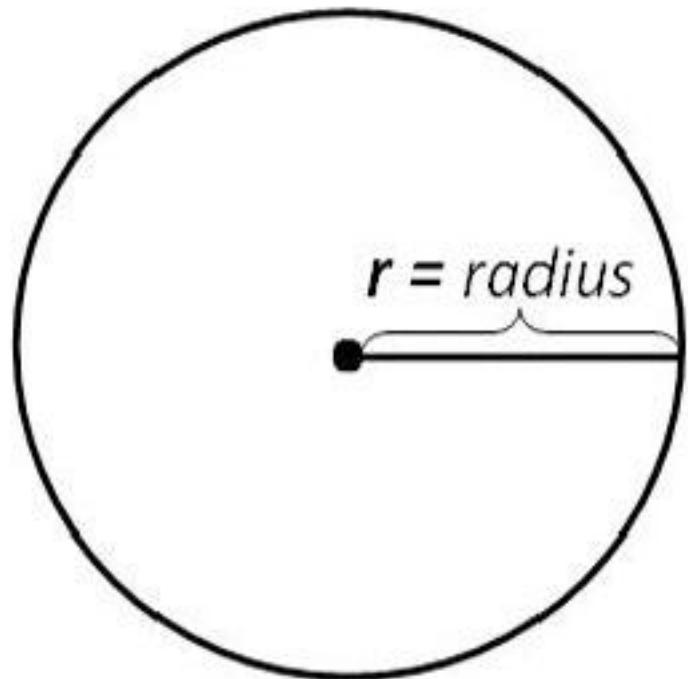


Pi Day 2016



Pi: An Approximate History









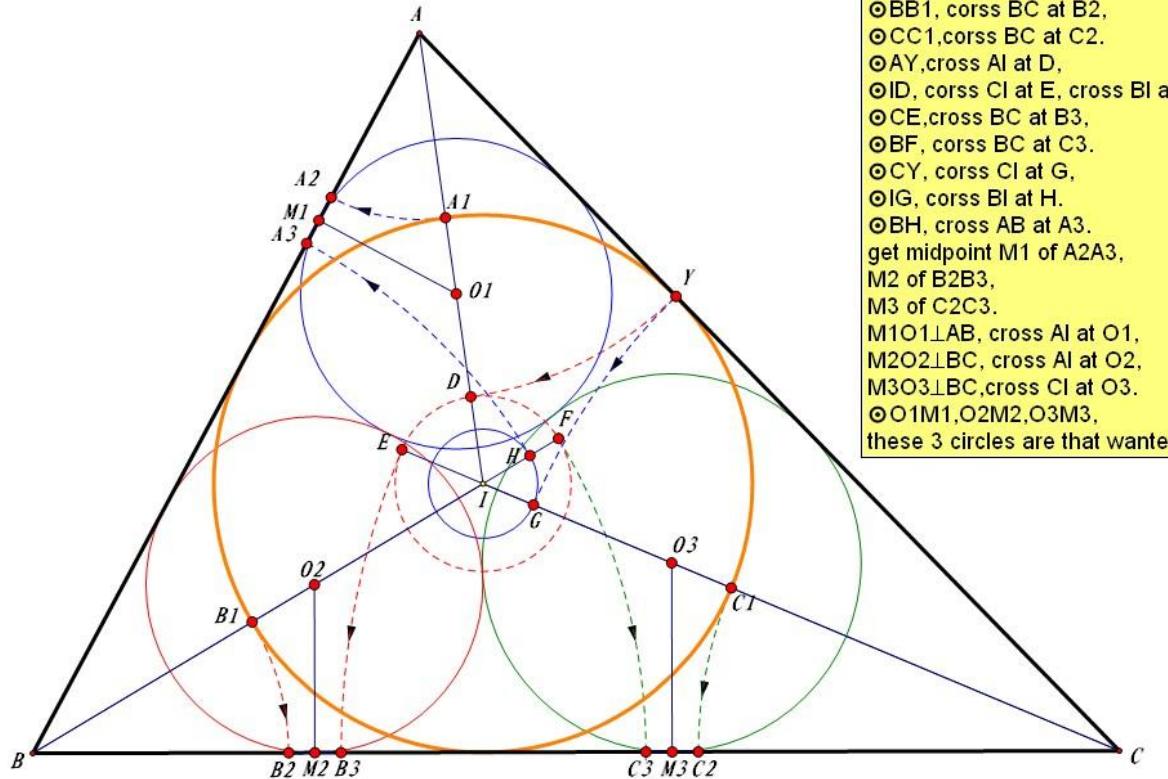


This image shows a fragment of an ancient manuscript, likely from the Greco-Roman period, written on papyrus. The document is oriented horizontally and consists of two columns of handwritten text in a dark, cursive script, possibly Demotic or Coptic. The paper is a light tan color, showing significant signs of age and damage, including numerous holes, discoloration, and irregular edges. The text is organized into two columns separated by a vertical margin line. There are several large, irregular holes along the left edge, suggesting insect damage or environmental factors. The overall appearance is that of a well-preserved historical artifact.



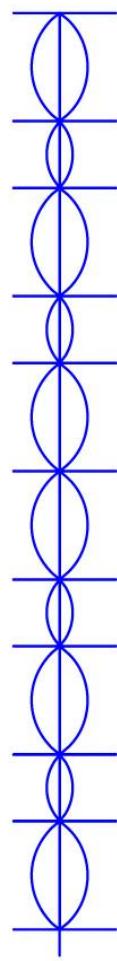
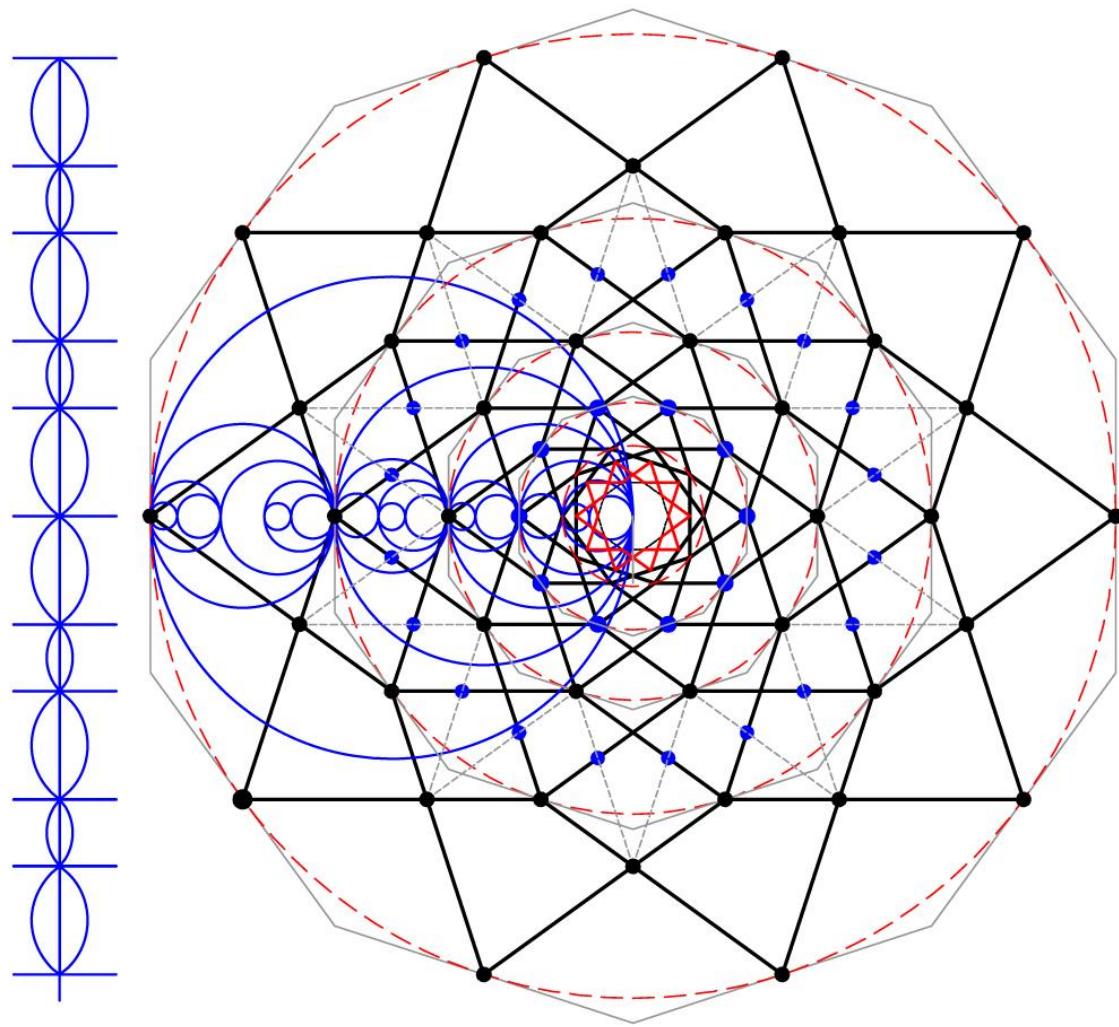
Construction 3 tangent circles in a triangle

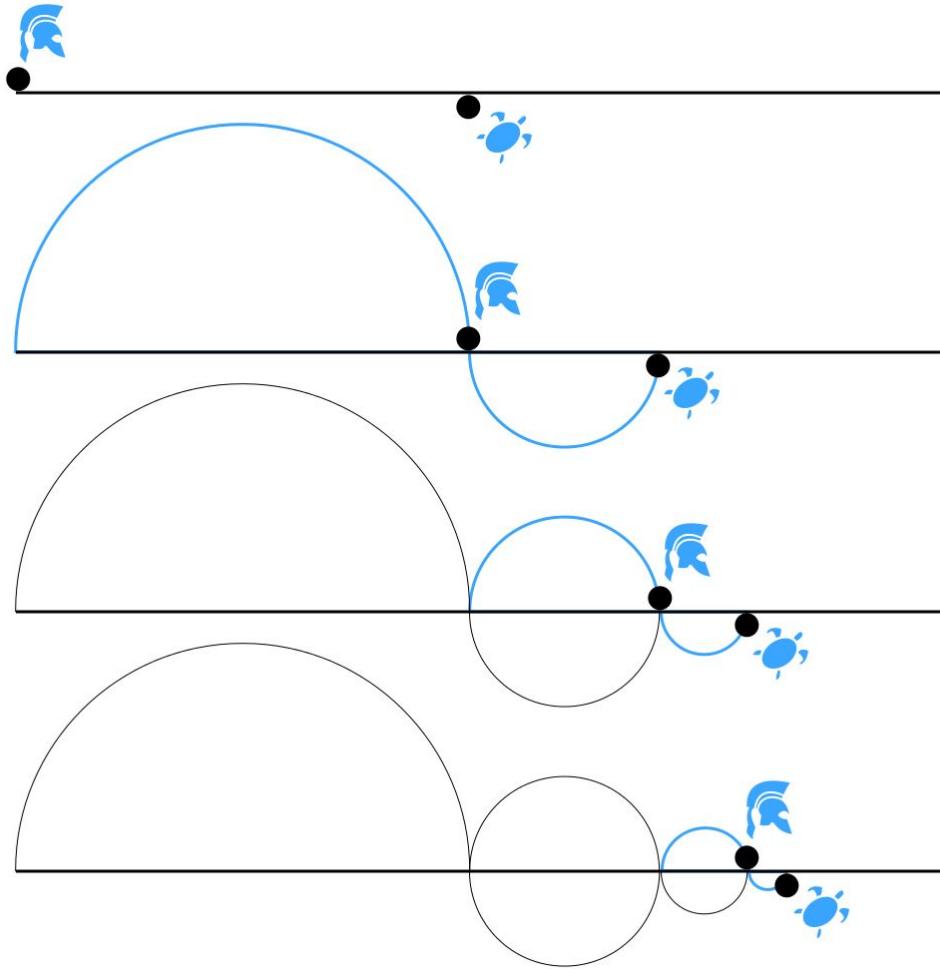
worked by chenbai on 18 Mar.,2013

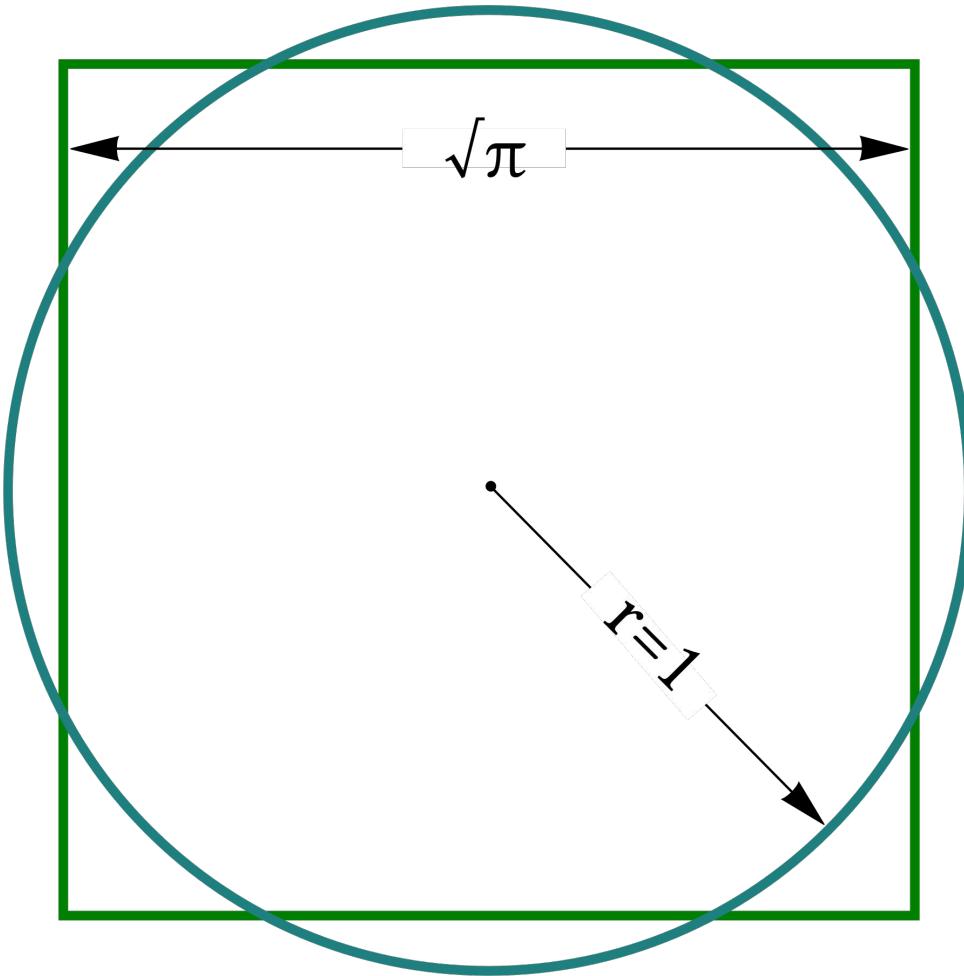


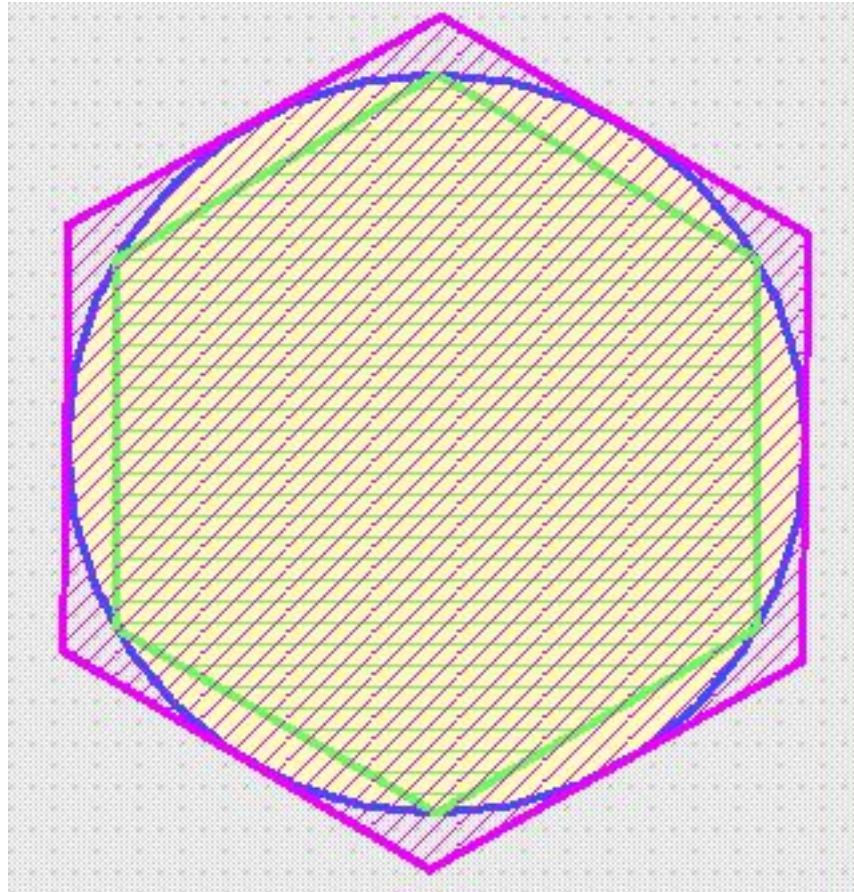
construction steps:

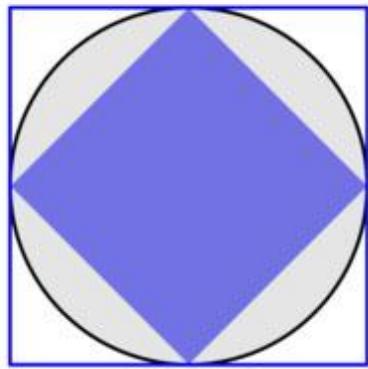
- △ABC, incircle I
- intersect AI,BI,CI
at A1,B1,C1,tangent AC at Y.
- ◎AA1,corss AB at A2,
- ◎BB1, corss BC at B2,
- ◎CC1,corss BC at C2.
- ◎AY,cross AI at D,
- ◎ID, corss CI at E, cross BI at F.
- ◎CE,cross BC at B3,
- ◎BF, corss BC at C3.
- ◎CY, corss CI at G,
- ◎IG, corss BI at H.
- ◎BH, cross AB at A3.
- get midpoint M1 of A2A3,
M2 of B2B3,
M3 of C2C3.
- M1O1⊥AB, cross AI at O1,
M2O2⊥BC, cross AI at O2,
M3O3⊥BC,cross CI at O3.
- ◎O1M1,O2M2,O3M3,
these 3 circles are that wanted.



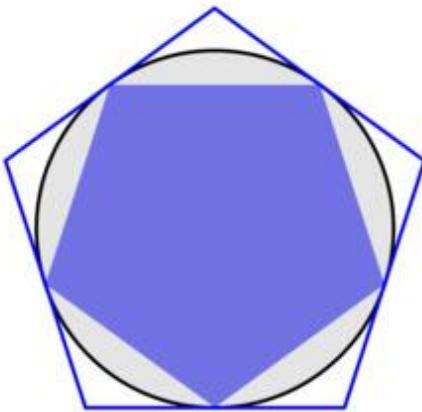




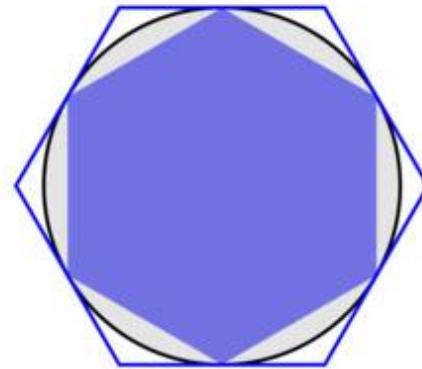




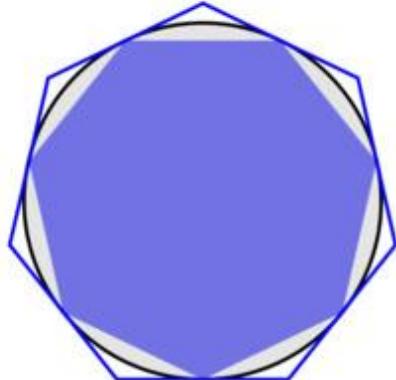
$n=4$



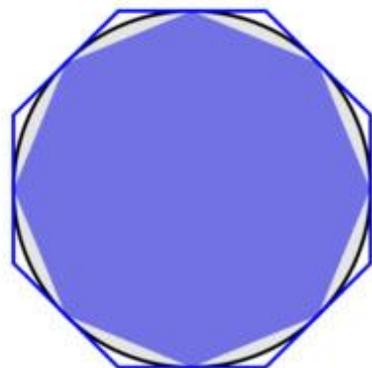
$n=5$



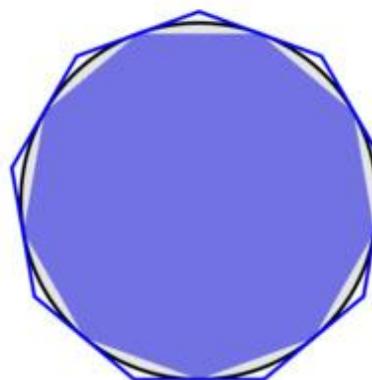
$n=6$



$n=7$



$n=8$



$n=9$

1

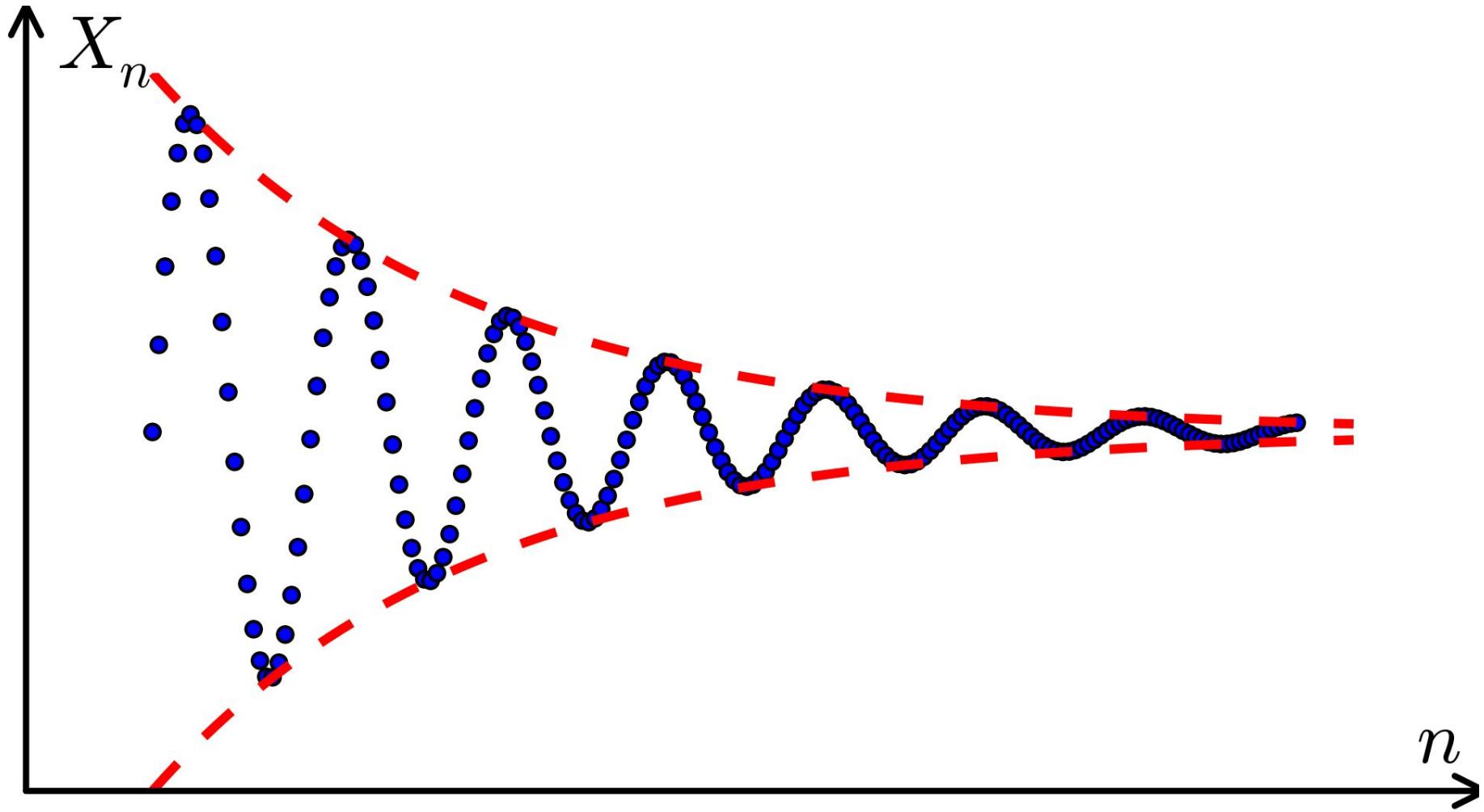
1/2

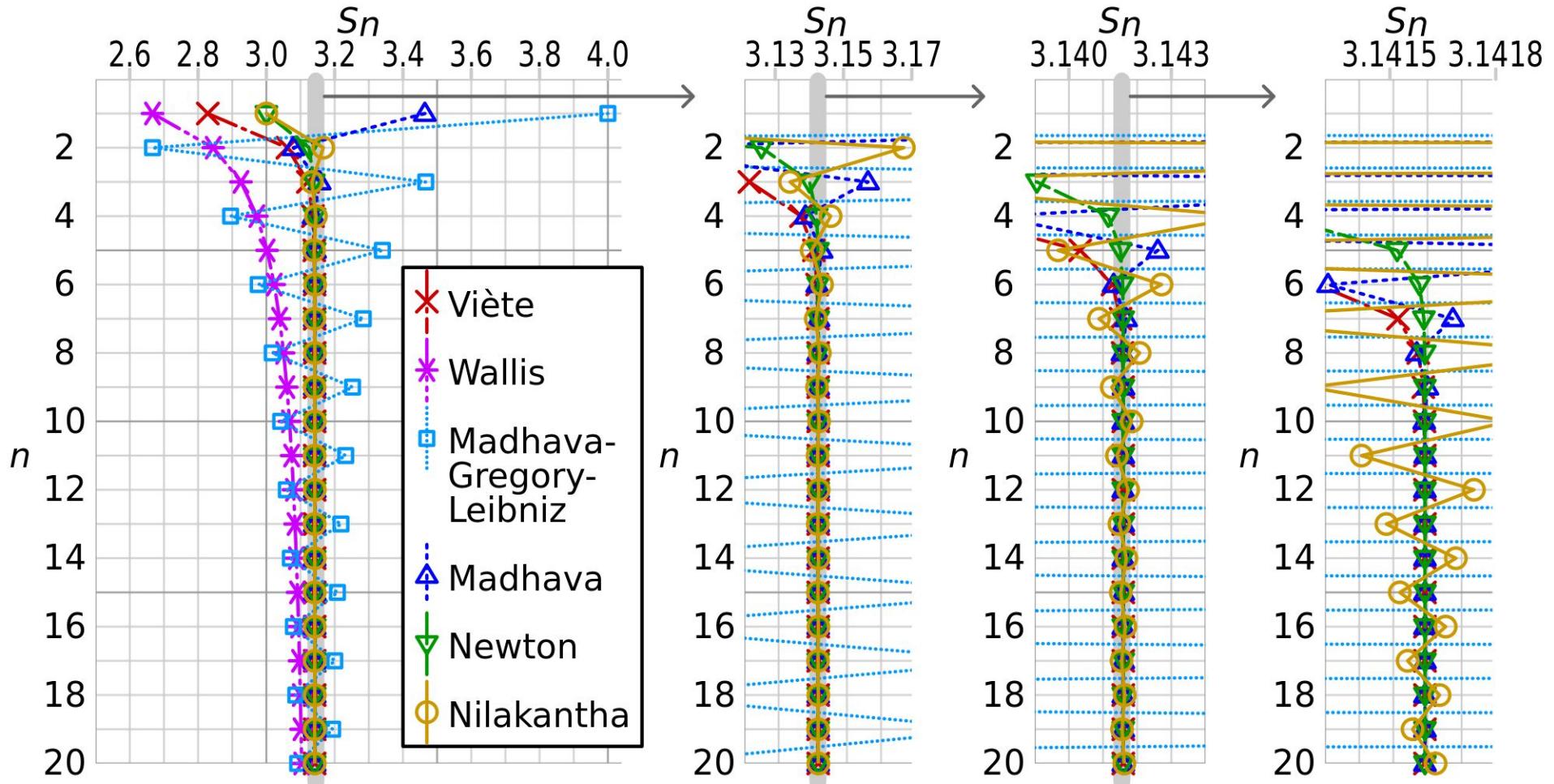
1/8

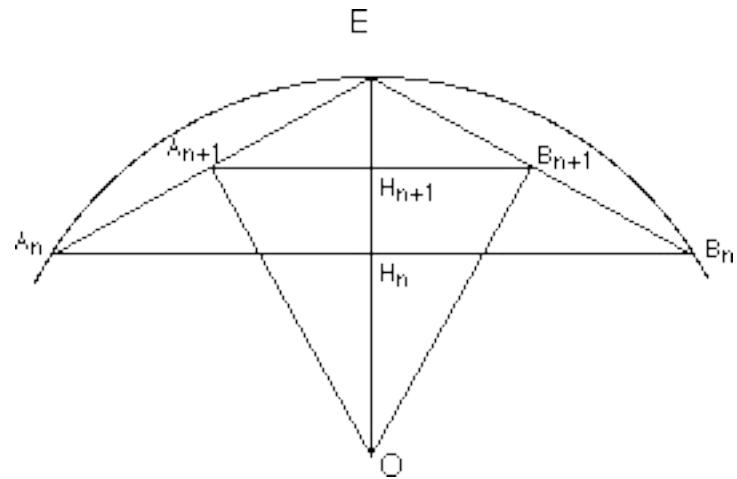
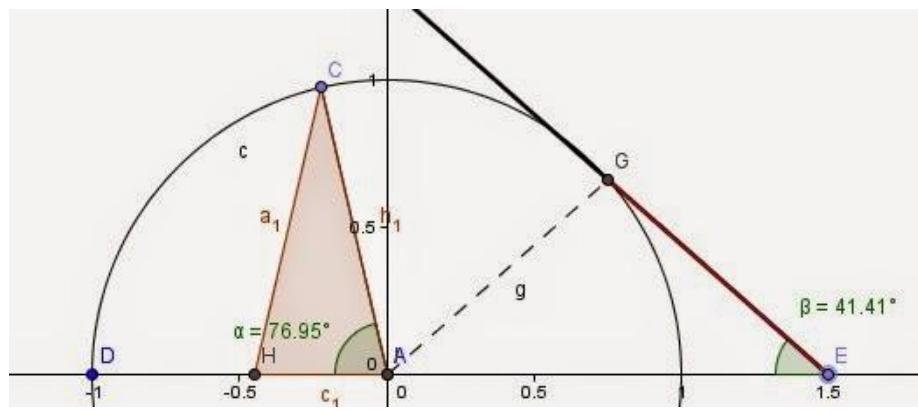
1/4

1/16

1/32







$$\frac{2}{\pi} = \frac{\sqrt{2}}{2} \cdot \frac{\sqrt{2+\sqrt{2}}}{2} \cdot \frac{\sqrt{2+\sqrt{2+\sqrt{2}}}}{2} \dots$$

$$\pi = \lim_{k \rightarrow \infty} 2^k \tan(\pi/2^k)$$

$$\pi = \lim_{n \rightarrow \infty} \frac{4}{n^2} \sum_{j=0}^n \sqrt{n^2 - j^2}$$

$$\frac{\pi}{6} = \frac{1}{\sqrt{3}} \left(1 - \frac{1}{3 \cdot 3} + \frac{1}{3^2 \cdot 5} - \frac{1}{3^3 \cdot 7} + \dots \right)$$

$$\pi = \sqrt{12} \sum_{k=0}^{\infty} \frac{(-3)^{-k}}{2k+1} = \sqrt{12} \sum_{k=0}^{\infty} \frac{(-\frac{1}{3})^k}{2k+1} = \sqrt{12} \left(\frac{1}{1 \cdot 3^0} - \frac{1}{3 \cdot 3^1} + \frac{1}{5 \cdot 3^2} - \frac{1}{7 \cdot 3^3} + \dots \right)$$

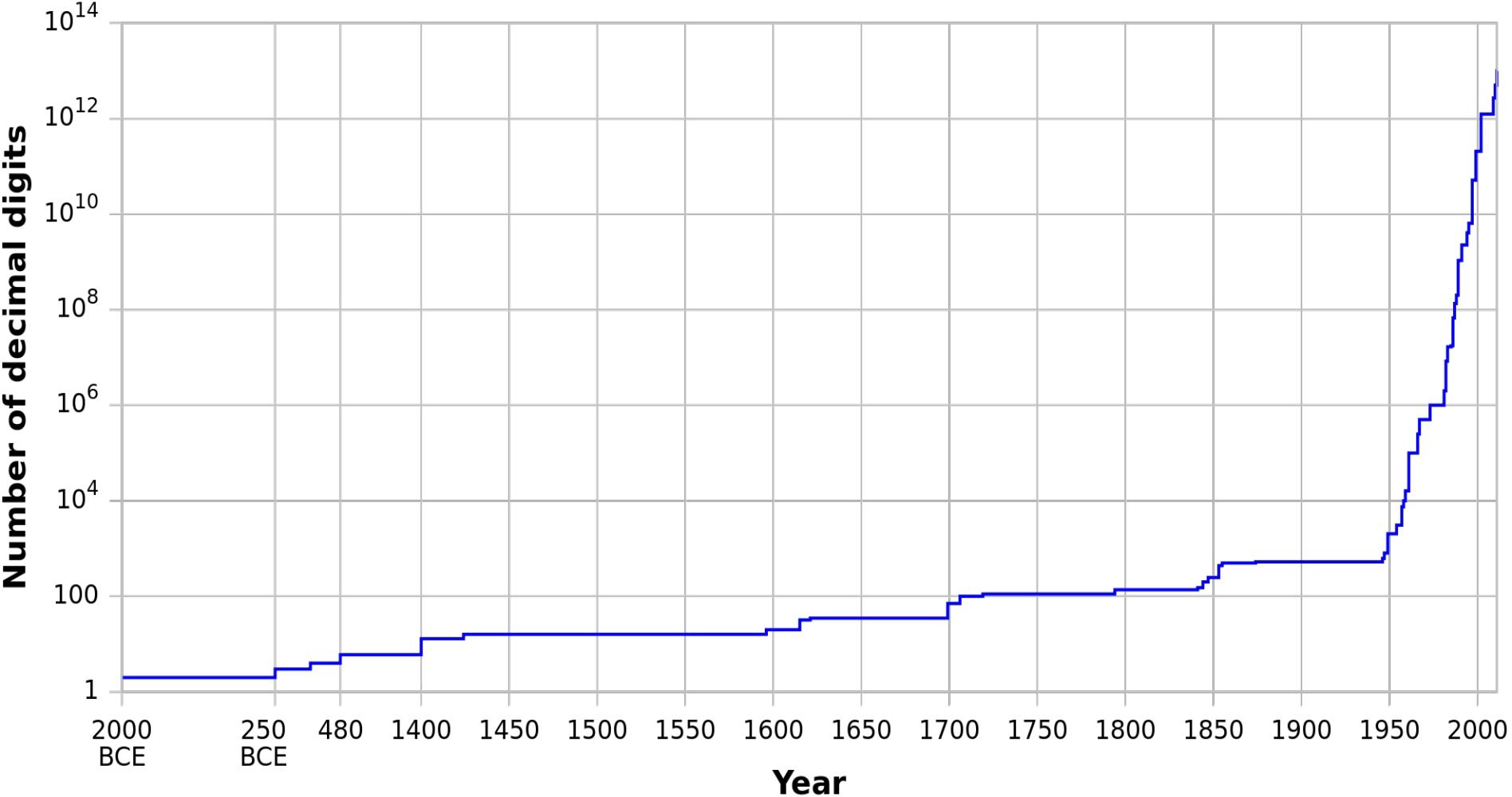
$$\frac{\pi}{2} = \sum_{k=0}^{\infty} \frac{k!}{(2k+1)!!} = \sum_{k=0}^{\infty} \frac{2^k k!^2}{(2k+1)!} = 1 + \frac{1}{3} \left(1 + \frac{2}{5} \left(1 + \frac{3}{7} (1 + \dots) \right) \right)$$

$$\pi = 20 \arctan \frac{1}{7} + 8 \arctan \frac{3}{79}$$

$$\frac{\pi}{4} = 4 \arctan \left(\frac{1}{5} \right) - \arctan \left(\frac{1}{239} \right)$$

-> Machin's formula (the best of the pre-computer era)

Record approximations of pi





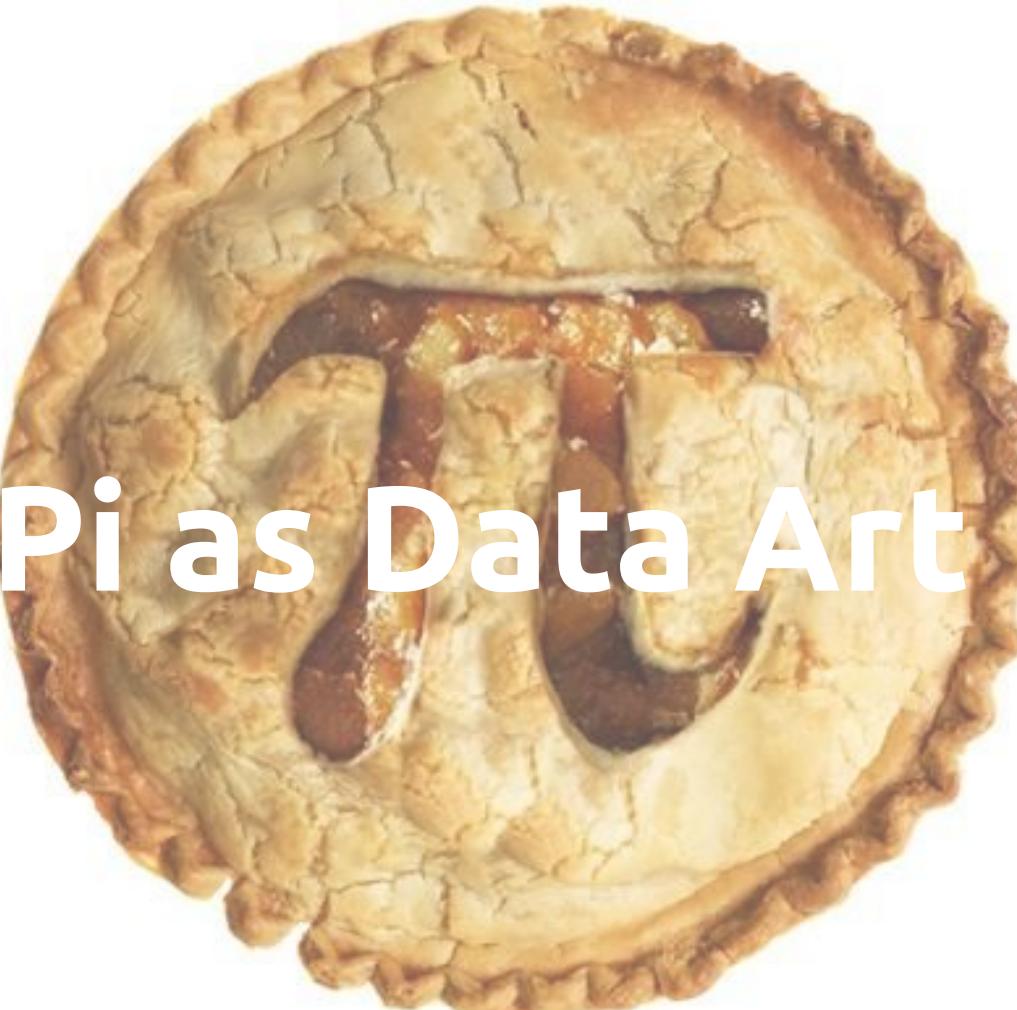
$$\frac{1}{\pi} = \frac{2\sqrt{2}}{9801} \sum_{k=0}^{\infty} \frac{(4k)!(1103 + 26390k)}{(k!)^4 396^{4k}}$$

$$\frac{1}{\pi} = 12 \sum_{k=0}^{\infty} \frac{(-1)^k (6k)! (13591409 + 545140134k)}{(3k)!(k!)^3 640320^{3k+3/2}}.$$

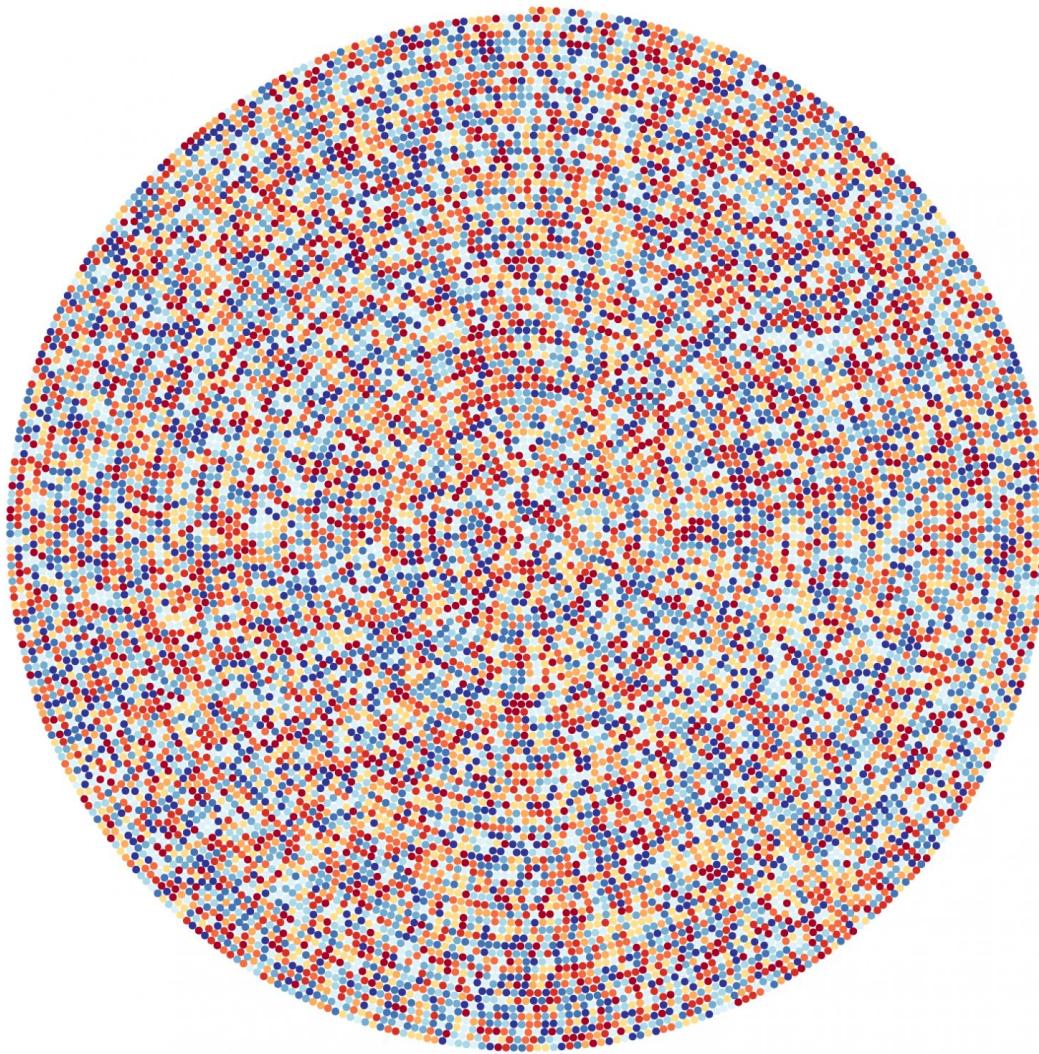




<http://www.numberworld.org/y-cruncher/>

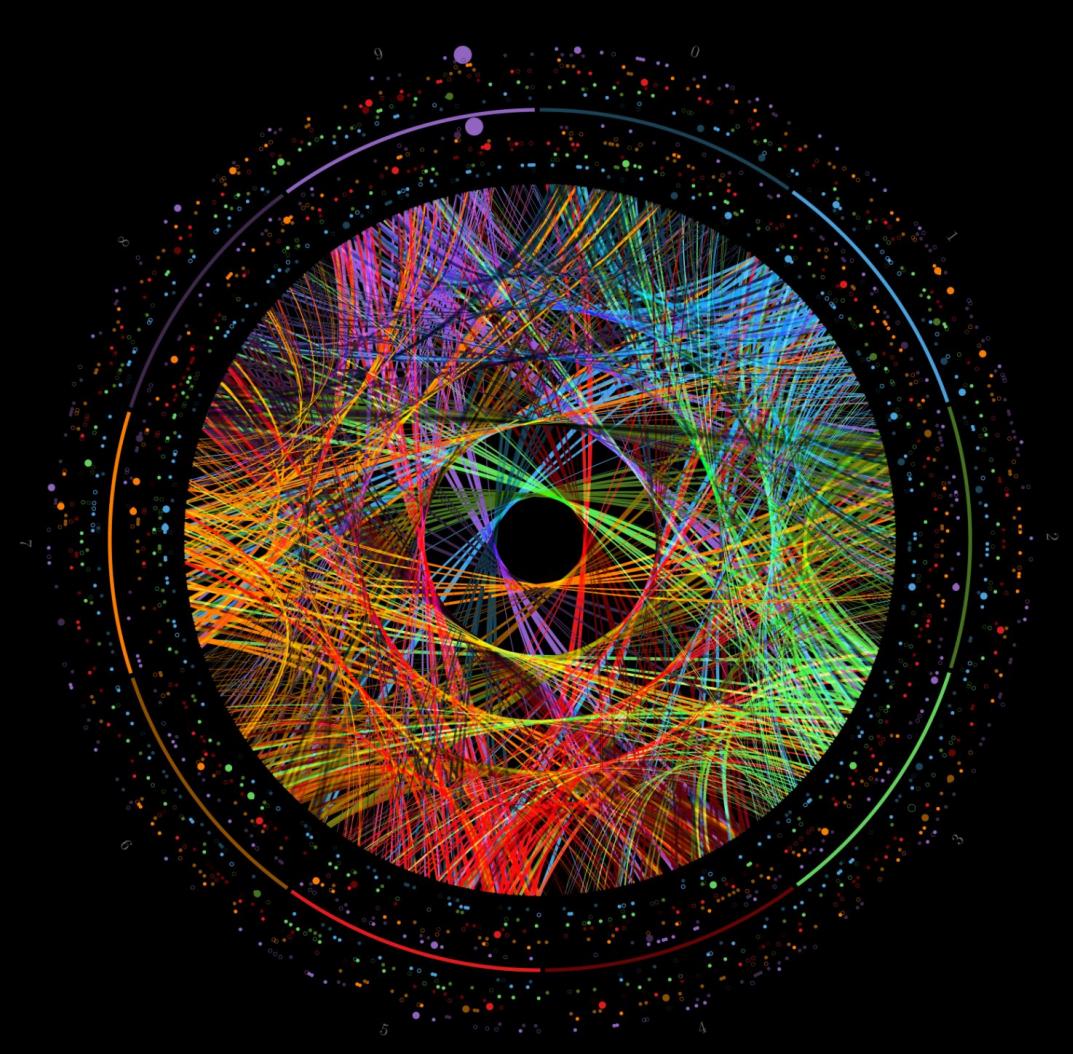


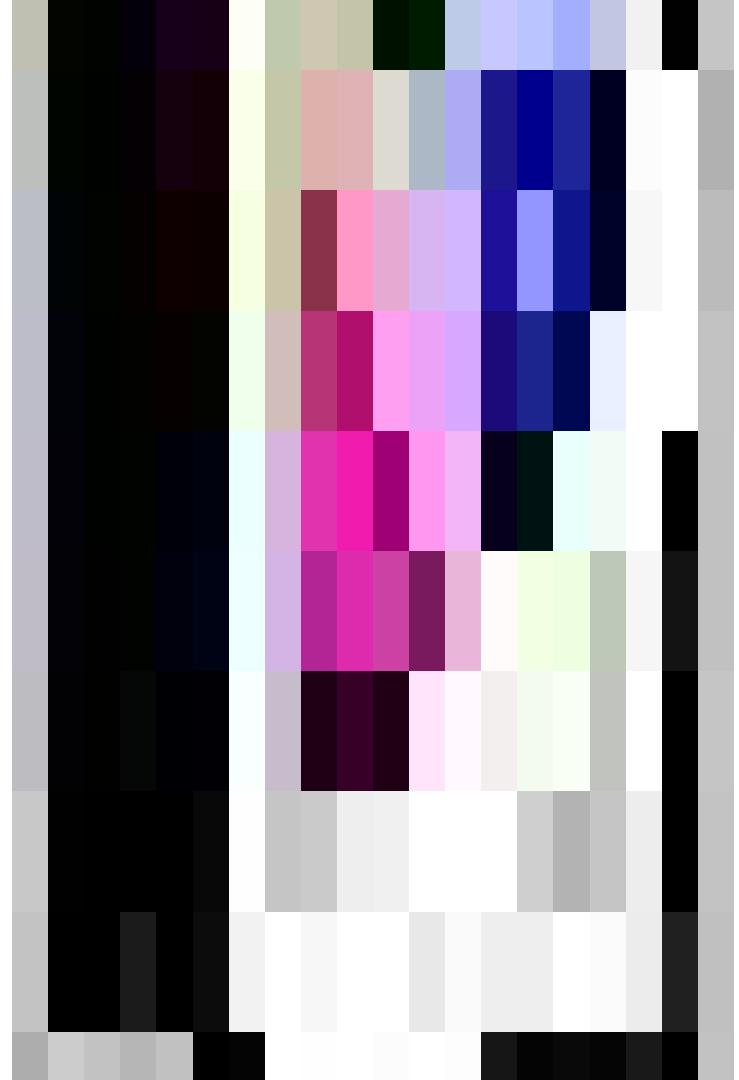
Pi as Data Art

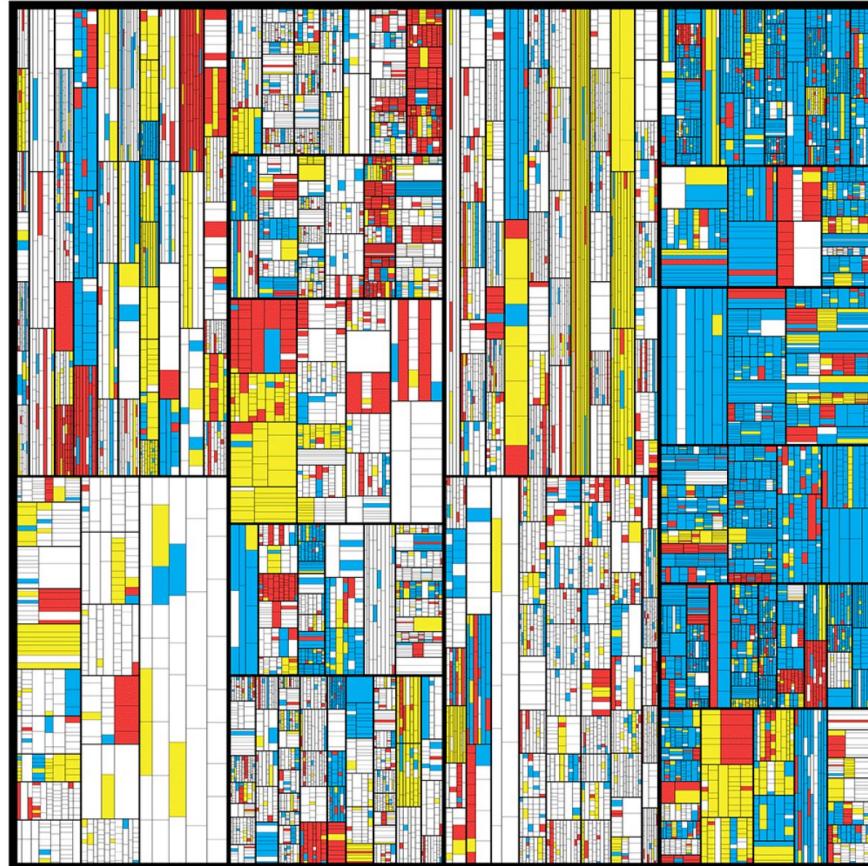


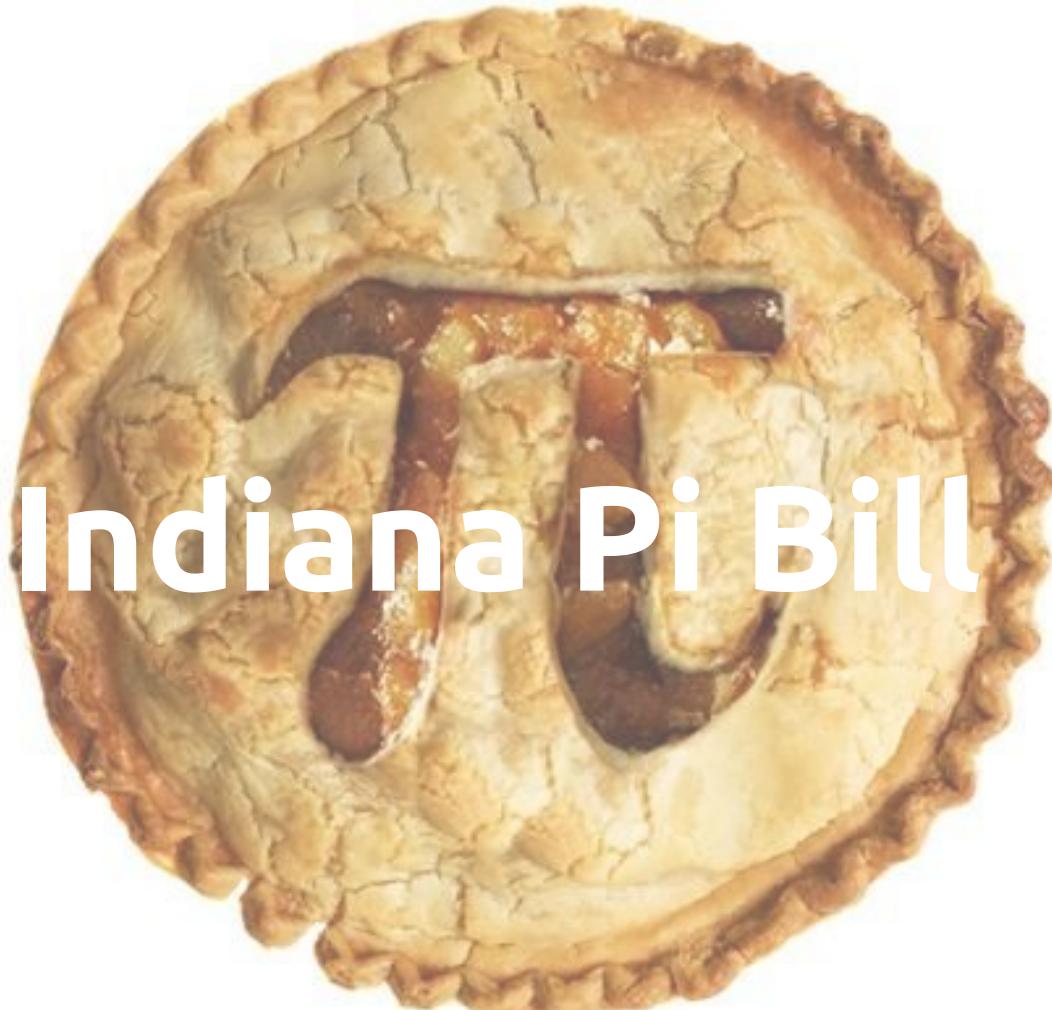
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567351885752724891227938183011949129833673362440656643086021394946395224737190
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5982534904 2875546873 1159562863 8823537875 9375195778 1857780532 1712268066 1300192787 6611195909 2164201989









Indiana Pi Bill



<https://www.youtube.com/watch?v=bFNjA9LOPsq>