Unit 163.163.
A backward look at 163 & Co.
163.163.1
π and 163
A pragmatic π approximation
π =
3.14159265358979323 84…

$$\pi \approx \frac{2^9}{163} =$$
3.141104294…

$$\pi \approx \frac{2^9}{163} + \frac{2^{-9}}{2^2} =$$
3.14159257…

$$\pi \approx \frac{2^9}{163} + \frac{2^{-9}}{2^2} + \frac{2^{-18}}{7^2} =$$
3.14159265357949221953799924… EPS

$$\pi \approx \frac{2^9}{163} + \frac{2^{-9}}{2^2} + \frac{2^{-18}}{7^2} + \frac{2^{-27}}{27^2} =$$
3.14159265358971248712104797 4… + DS

The next step?

Other pragmatic π approximations?

$$\pi \approx \frac{2^{9}}{163} + \frac{2^{-9}}{2^{2}} + \frac{2^{-18}}{7^{2}} + \frac{2^{-36}}{?^{2}} =$$

3.1415926535 …

163.163.2

Unit 15, part 27

Beispiel

Und wie geht es hier weiter?

$$\pi \approx \frac{2^{9}}{9^{\text{th}}\,\text{Heegner number} = 163} + \frac{2^{-9}}{2^{2}} + \frac{2^{-18}}{7^{2}} + ???$$

$$= \underline{3.141592654}\ldots$$

A nugget or only a mayfly?

The number **691** is well-known as **„Bernoulli marker“**:

“691 prime number, (negative) numerator of the Bernoulli number B_{12} = -691/2730. Ramanujan's tau function τ and the divisor function σ_{11} are related by the remarkable congruence $\tau(n) \equiv \sigma_{11}(n) \pmod{691}$. In number theory, 691 is a "marker" (similar to the radioactive markers in biology): whenever it appears in a computation, one can be sure that Bernoulli numbers are involved.”

https://en.wikipedia.org/wiki/600_(number)

Look for more similar markers in computation and in number theory.

Collateral:

$$\frac{691}{163} = 4.(2392638036809815950920245398773006134$$
$$96932515337423312883435582822085889570552147)_{per} = [4;4,5,1,1,3]$$

Heegner number 163 [1] and Feigenbaum constant δ [2-5]

$$\delta = 4.669201609102990671853203821578...$$

$$\delta \approx \underline{4}$$

$$\delta \approx 4 * \frac{1+\frac{12^2}{163}+...}{1+\frac{10^2}{163}+...} = \underline{4.669201}\ 5209...$$

$$\delta \approx 4 * \frac{1+\frac{12^2}{163}+\frac{4*12^2+31}{4*163^2}+...}{1+\frac{10^2}{163}+\frac{10^2+30}{163^2}+...}$$

$$= \underline{4.669201609}\ 33975...$$

Next step?

$$\pi \approx \frac{2^9}{9^{th}\text{ Heegner number } = 163} + \frac{2^{-9}}{2^2} + \frac{2^{-18}}{7^2}$$

$$= \underline{3.141592654}...$$

Next step?

How about e and 163?

$$\frac{163+1}{4} e = 111.449554966...???$$

References

[1] https://en.wikipedia.org/wiki/Heegner_number
[2] H.-O. Peitgen, H. Jürgens, D. Saupe. Chaos and Fractals. New Frontiers of Science. Springer-Verlag 1992. Chapter 11
[3] Weisstein, Eric W. "Feigenbaum Constant." From *MathWorld*--A Wolfram Web Resource. http://mathworld.wolfram.com/FeigenbaumConstant.html
[4] Weisstein, Eric W. "Feigenbaum Constant Approximations." From *MathWorld*—A Wolfram Web Resource. http://mathworld.wolfram.com/FeigenbaumConstantApproximations.html
[5] http://en.wikipedia.org/wiki/Feigenbaum_constants
[6] Weisstein, Eric W. "Pi Approximations." From *MathWorld*--A Wolfram Web Resource. http://mathworld.wolfram.com/PiApproximations.html

163.163.3
Unit 15, part 28
How about e and 163?

$$\frac{163+1}{4}e = 111.449554966...???$$

$$\text{scf}\left(\frac{163+1}{4}e\right) =$$

[111; 2, 4, 2, 5, 5, 1, 30, 3, 3, 1, 8, 1, 12, 12, 3, 1, 1, 1, 1, 1, 1, 10, 81, 1, 4, 1, 1, 2, 81, 1, 1, 4, 1, 5, 1, 1270, 1, 4, 3, 1, 1, 2, 8, 2, 4, 12, 1, 2, 3, 1, 9, 1, 2, 4, 1, 9, 3, 1, 2, 1, 10, 6, 2, 6, 4, 1, 1, 3, 2, 2, 1, 2090, 1, 2, 3, 1, 4, 1, 3, 81, 1, 2, 1, 1, 1, 4, 3, 81, 1, 2, 9, 1, 3, 1, 3, 1, 1, 3, 2, 2, 8, 8, 2, 2, 1, 9, 1, 1, 1, 6, 3, 3, 2, 26, 2, 1, 1, 9, 9, 1, 1, 2, 1, 1, 3, 3, 1, 1, 1, 2, 1, 10, 1,

1, 81, 2, 81, 2, 81, 1, 1, 11, 1, 2, 2, 1, 1, 2, 3, 1, 1, 3, 1, 1, 8, 8, 1, 1, 3, 27, 2, 4, 3,
5, 1, 1, 2, 9, 1, 3, 2, 9, 9, 2, 3, 3, 1, 1, 2, 1, 1, 1, 2, 1, 9, 1, 1, 1, 1, 81, 2, 1, 1, 4, 1,
1, 1, 1, 1, 1, 1, 81, 2, 1, 1, 1, 4, 1, 4, 2, 1, 1, 4632, 1, 1, 2, 3, 3, 1, 1, 2, 1, 2, 7, 2,
4, 1, 2, 11, 1, 2, 2, 2, 1, 1, 9, 1, 2, 1, 2, 3, 1, 9, 2, 2, 1, 1, 2, 1, 10, 1, 2, 5, 2, 6, 1,
2, 3, 1, 1, 3, 2, 1, 2, 1, 1, 5452, 1, 1, 2, 1, 3, 1, 4, 1, 2, 2, 1, 81, 3, 2, 1, 1, 1, 4, 2,
2, 1, 81, 3, 2, 9, 1, 3, 3, 3, 1, 1, 3, 2, 1, 2, 1, 8, 8, 1, 2, 1, 2, 1, 9, 1, 1, 3, 6, 3, 3, 1,
2, 1, 26, 2, 1, 3, 9, 9, 3, 1, 2, 1, 1, 3, 3, 3, 1, 1, 2, 1, 10, 1, 3, 81, 1, 2,

1, 81, 4, 81, 1, 3, 11, 1, 2, 2, 3, 1, 2, 3, 1, 1, 3, 3, 1, 8, 8, 1, 3, 3, 27, 4, 4, 3,
5, 1, 3, 2, 9, 1, 3, 4, 9, 9, 4, 3, 3, 1, 1, 2, 1, 3, 1, 2, 1, 9, 1, 1, 3, 1, 81, 4, 1, 1, 4, 1,
1, 1, 1, 1, 3, 1, 81, 4, 1, 1, 1, 4, 1, 4, 4, 1, 1, 7994, 1, 1, 4, 3, 3, 1,1, 2, 1, 4, 7, 2,
4, 1, 4, 11, 1, 2, 2, 4, 1, 1, 9, 1, 2, 1, 4, 3, 1, 9, 2, 4, 1, 1, 2, 1, 10, 1, 4, 5, 2, 6, 1,
4, 3, 1, 1, 3, 2, 1, 4, 1, 1, 8814, 1, 1, 4, 1, 3, 1, 4, 1, 2, 4, 1, 81, 5, 2, 1, 1, 1, 4, 2,
4, 1, 81, 5, 2, 9, 1, 3, 5, 3, 1, 1, 3, 2, 1, 4, 1, 8, 8, 1, 4, 1, 2, 1, 9, 1, 1, 5, 6, 3, 3, 1,
4, 1, 26, 2, 1, 5, 9, 9, 5, 1, 2, 1, 1, 3, 3, 5, 1, 1, 2, 1, 10, 1, 5, 81, 1, 4,

1, 81, 6, 81, 1, 5, 11, 1, 2, 2, 5, 1, 2, 3, 1, 1, 3, 5, 1, 8, 8, 1, 5, 3, 27, 6, 4, 3,
5, 1, 5, 2, 9, 1, 3, 6, 9, 9, 6, 3, 3, 1, 1, 2, 1, 5, 1, 2, 1, 9, 1, 1, 5, 1, 81, 6, 1, 1, 4, 1,
1, 1, 1, 1, 5, 1, 81, 6, 1, 1, 1, 4, 1, 4, 6, 1, 1, 11356, 1, 1, 6, 3, 3, 1, 1, 2, 1, 6, 7, 2,
4, 1, 6, 11, 1, 2, 2, 6, 1, 1, 9, 1, 2, 1, 6, 3, 1, 9, 2, 6, 1, 1, 2, 1, 10, 1, 6, 5, 2, 6, 1,
6, 3, 1, 1, 3, 2, 1, 6, 1, 1, 12176, 1, 1, 6, 1, 3, 1, 4, 1, 2, 6, 1, 81, 7, 2, 1, 1, 1, 4, 2,
6, 1, 81, 7, 2, 9, 1, 3, 7, 3,1, 1, 3, 2, 1, 6, 1, 8, 8, 1, 6, 1, 2, 1, 9, 1, 1, 7, 6, 3, 3, 1,
6, 1, 26, 2, 1, 7, 9, 9, 7, 1, 2, 1, 1, 3, 3, 7, 1, 1, 2, 1, 10, 1, 7, 81, 1, 6,

1, 81, 8, 81, 1, 7, 11, 1, 2, 2, 7, 1, 2, 3, 1, 1, 3, 7, 1, 8, 8, 1, 7, 3, 27, 8, 4, 3,
5, 1, 7, 2, 9, 1, 3, 8, 9, 9, 8, 3, 3, 1, 1, 2, 1, 7, 1, 2, 1, 9, 1, 1, 7, 1, 81, 8, 1, 1, 4, 1,
1, 1, 1, 1, 7, 1, 81,8, 1, 1, 1, 4, 1, 4, 8, 1, 1, 14718, 1, 1, 8, 3, 3, 1, 1, 2, 1, 8, 7, 2,
4, 1, 8, 11, 1,2, 2, 8, 1, 1, 9, 1, 2, 1, 8, 3, 1, 9, 2, 8, 1, 1, 2, 1, 10, 1, 8, 5, 2, 6, 1,
8, 3, 1,1, 3, 2, 1, 8, 1, 1, 15 538, 1, 1, 8, 1, 3, 1, 4, 1, 2, 8, 1, 81, 9, 2, 1, 1, 1, 4, 2,
8, 1, 81, 9, 2, 9, 1, 3, 9, 3, 1, 1, 3, 2, 1, 8, 1, 8, 8, 1, 8, 1, 2, 1, 9, 1, 1, 9, 6, 3, 3, 1,
8, 1, 26, 2, 1, 9, 9, 9, 9, 1, 2, 1, 1, 3, 3, 9, 1, 1, 2, 1, 10, 1, 9, 81, 1, 8,

1, 81, 10, 81, 1, 9, 11, 1, 2, 2, 9, 1, 2, 3, 1, 1, 3, 9, 1, 8, 8, 1, 9, 3, 27, 10, 4, 3,
…] quasiperiodic, analysis!, 2D representation?

163 scf curiosities

$$\frac{3^5}{163} = 1 + \cfrac{1}{2 + \cfrac{1}{2*13 + \cfrac{1}{1 + \cfrac{1}{2}}}}$$

$$\frac{3^7}{163} = 13 + \cfrac{1}{2 + \cfrac{1}{2 + \cfrac{1}{1 + \cfrac{1}{1 + \cfrac{1}{13}}}}}$$

$$\frac{13}{163} = \cfrac{1}{12 + \cfrac{1}{1 + \cfrac{1}{1 + \cfrac{1}{6}}}}$$

$$\frac{13+12}{163} = \cfrac{1}{6 + \cfrac{1}{1 + \cfrac{1}{1 + \cfrac{1}{12}}}}$$

163.163.4
Unit 15, part 29
163 scf curiosities, continuation

scf(13/163) =
0.079754601226993865030674846625766871165644171779141104294478527607361963190184049
079754601226993865030674846625766871165644171779141104294478527607361963190184049
079754601226993865030674846625766871…) =
[0; 12, 1, 1, 6]

$$\text{scf}(\frac{3^5}{163}) = [1;2,26,1,2]$$

$$\text{scf}(\frac{3^7}{163}) = [13;,2,2,1,1,13]$$

$$\text{scf}(\frac{3^8}{163}) = [40;3,1,40]$$

$$\text{scf}(\frac{1}{3}\sqrt{163}) = [4;3,1,(10,5,2,1,1,1,3,1,1,1,2,5)_{\text{per}}]$$

$\Uparrow$ palindromic

$$[10;5,2,1,1,1,3,1,1,1,2,5] = ???$$

$$\frac{e^{163}}{163^{32}} = 0.999993574...$$

(almost integer, see [1,2])

$$\frac{2^9}{163} = 3.141104\ 294...$$

$$\frac{2^4}{\ln 163} = 3.141104\ 171...$$

[1] Weisstein, Eric W. "Almost Integer." From *MathWorld*—A Wolfram Web Resource. http://mathworld.wolfram.com/AlmostInteger.html

[2] https://en.wikipedia.org/wiki/Almost_integer

16.11.2019 EPScoll