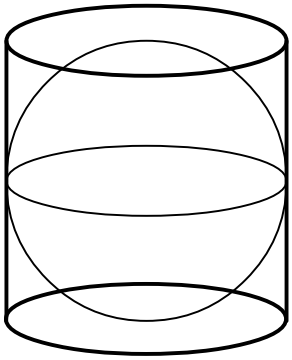
1. *Primes and the zeta function:*

$$\prod_p \frac{1}{1-\frac{1}{p^s}} = \sum_{n=1}^{\infty} \frac{1}{n^s}$$

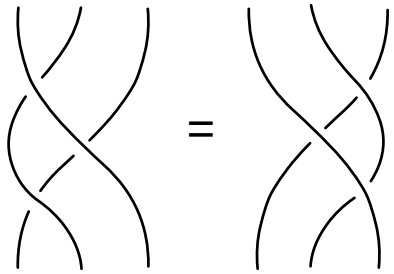
2. *Archimedes. Volume of Sphere:*



$$v = \frac{2}{3}V$$

3. *Yang-Baxter Equation*

$$R_{12}R_{23}R_{12} = R_{23}R_{12}R_{23}$$



4. *Gauss. Quadratic reciprocity:*

$$\left(\frac{p}{q}\right)\left(\frac{q}{p}\right) = (-1)^{\frac{p-1}{2}\frac{q-1}{2}}$$

5. *Completing the square:*

$$ax^2 + bx + c = a\left(x + \frac{b}{2a}\right)^2 - \frac{b^2 - 4ac}{4a}$$

6. *Newton's Law:*

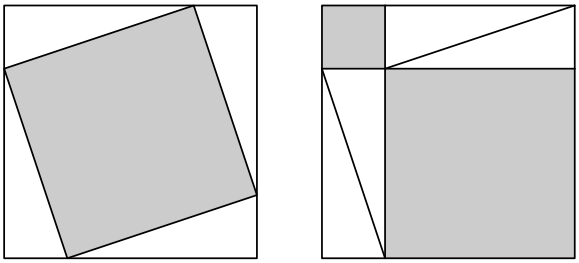
$$\mathbf{F} = m\mathbf{a}$$

7. *Newton's Law of Gravitation:*

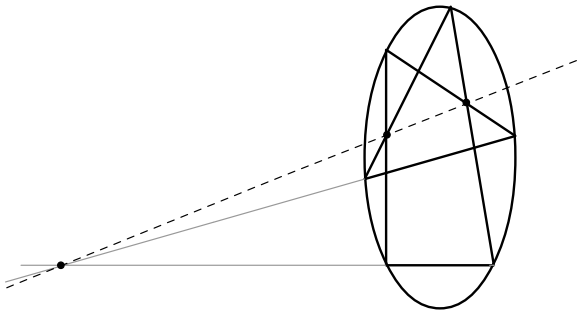
$$F = \frac{Gm_1m_2}{r^2}$$

8. *Pythagoras' Theorem with no-word proof:*

$$c^2 = a^2 + b^2$$



9. *Pascal's Hexagon Theorem:*



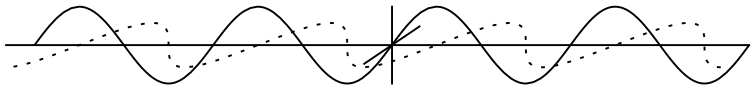
10. *Euler's Equation:*

$$e^{i\pi} + 1 = 0$$

11. *Schrödinger's Equation:*

$$i\hbar\frac{\partial\psi}{\partial t} = -\frac{\hbar^2}{2m}\nabla^2\psi + V\psi$$

12. *Maxwell's Equations in Vacuum imply Wave Equation:*



$$\begin{array}{l} \nabla\cdot\mathbf{B} = 0 \\ \nabla\times\mathbf{B} = \frac{1}{c}\frac{\partial\mathbf{E}}{\partial t} \\ \nabla\cdot\mathbf{E} = 0 \\ \nabla\times\mathbf{E} = -\frac{1}{c}\frac{\partial\mathbf{B}}{\partial t} \end{array} \quad \Rightarrow \quad \nabla^2\mathbf{E} = \frac{1}{c^2}\frac{\partial^2\mathbf{E}}{\partial t^2}$$

13. *Einstein's Equation:*

$$E = mc^2$$

14. *Einstein's General Relativity Equation:*

$$R_{\mu\nu} - \frac{1}{2}Rg_{\mu\nu} + \Lambda g_{\mu\nu} = 8\pi T_{\mu\nu}$$

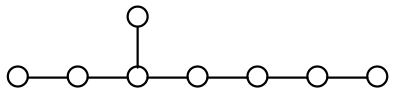
15. *Einstein quotation from Fine Hall Common Room Fireplace:*

Raffiniert ist der Herr Gott, aber boshaft ist er nicht.

16. *Heisenberg Uncertainty Principle:*

$$\Delta x \Delta p \geq \frac{\hbar}{2}$$

17. *Dynkin diagram of E_8:*



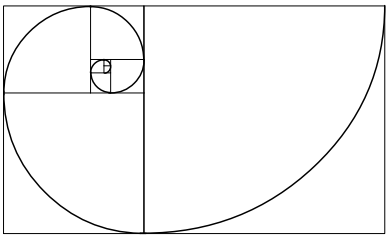
18. *Quotation from Harish-Chandra:*

Why has God made the exceptional groups?

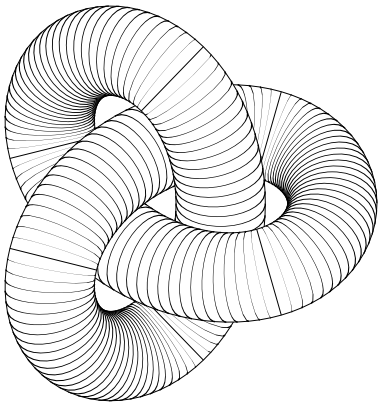
19. *Limiting ratio of Fibonacci numbers = golden mean = partial fraction expansion:*

$$\lim_{n\to\infty}\frac{F_{n+1}}{F_n}=\frac{1+\sqrt{5}}{2}=1+\frac{1}{1+\frac{1}{1+\frac{1}{1+\ldots}}}$$

$$\lim_{n\to\infty}\frac{F_{n+1}}{F_n}=1+\frac{1}{1+\ldots}$$



20. *Wilson loop average w.r.t Chern-Simons action gives knot invariant:*



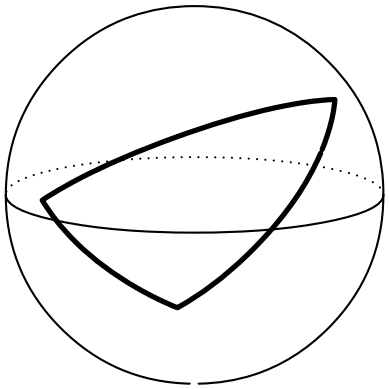
$$V_K(q)\;=\;q+q^3-q^4$$

$$V_K\Big(q=\mathrm{e}^{\frac{2\pi i}{k+2}}\Big)\;=\;\frac{1}{Z}\int_{\mathcal{A}}\mathrm{Tr}_{\mathbf{2}}\mathrm{P}\exp\Big(-\oint_{\mathrm{K}}\mathrm{A}\Big)\,\mathrm{e}^{\frac{\mathrm{ik}}{4\pi}\,\mathrm{CS(A)}}\mathcal{D}\mathrm{A}$$

$$\frac{1}{Z}\int_{\mathcal{A}}(\mathrm{Tr}_{\mathbf{2}}\mathrm{P}\oint_{\mathrm{K}}\mathrm{A})\,\mathrm{e}^{\frac{\mathrm{ik}}{4\pi}\,\mathrm{CS(A)}}\mathcal{D}\mathrm{A}$$

$$\frac{1}{Z}\int_{\mathcal{A}}(\mathrm{Tr}_{\mathbf{2}}\mathrm{P}\oint_{\mathrm{K}}\mathrm{A})\,\mathrm{e}^{\frac{\mathrm{ik}}{4\pi}\int_{\mathrm{M}}\mathrm{Tr}(\mathrm{A}\wedge\mathrm{dA}+\frac{2}{3}\mathrm{A}\wedge\mathrm{A}\wedge\mathrm{A})}\mathcal{D}\mathrm{A}$$

21. *Gauss-Bonnet for spherical triangle:*

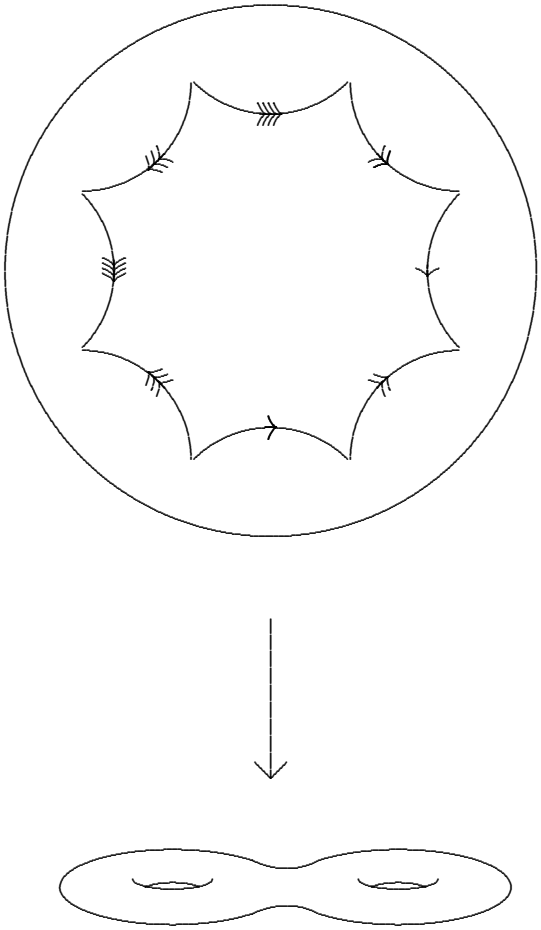


$$\alpha + \beta + \gamma = \pi + \frac{A}{R^2}$$

22. *Stokes' Theorem*

$$\int_M d\omega = \int_{\partial M} \omega$$

23. *Uniformization of a surface of genus* 2*:*



24. *Atiyah-Singer Theorem for Twisted Dirac Operator:*

$$\dim\ker(\not\partial) - \dim\ker(\not\partial^*) = \int_{M^{4k}} \hat{A}(M) \smile ch(E)$$

25. *Generalized Gauss-Bonnet Formula:*

$$\chi(M^{2n}) = \frac{1}{(8\pi)^n n!} \int_M \underbrace{R^{ij}_{ab} \cdots R^{k\ell}_{cd}}_{n} \varepsilon^{ab\cdots cd} \varepsilon_{ij\cdots k\ell} \, d\mu$$

26. *Classical Gauss-Bonnet Theorem:*

$$\chi(M^2) = \frac{1}{2\pi}\int_M K\ dA$$

$\chi(M) = -4$ 

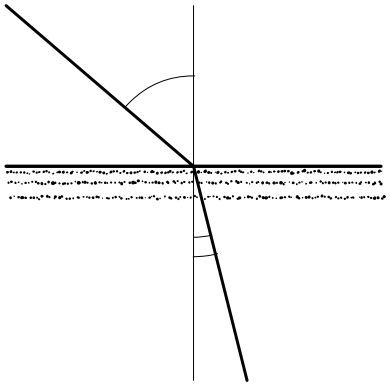
27. *Chern-Simons Action:*

$$S_{CS} = \frac{k}{4\pi}\int_M \mathrm{Tr}\left(A\wedge dA + \frac{2}{3}A\wedge A\wedge A\right)$$

28. *Witten's AdS/CFT prescription:*

$$\left\langle e^{\int_{S^d}\varphi_0\mathcal{O}}\right\rangle_{CFT_d} = Z_{AdS_{d+1}}[\varphi_0]$$

29. *Snell's (Pascal's) Law:*



$$\sin i = n\sin r$$

30. *Veneziano amplitude:*

$$S(k_1;k_2;k_3;k_4) = \frac{2ig_o^2}{\alpha'}(2\pi\delta)^{26}\left(\sum_i k_i\right)[B(-\alpha(s),-\alpha(t))+B(-\alpha(s),-\alpha(u))+B((-\alpha(t),-\alpha(u))]$$

31. *Liouville equation:*

$$\partial_z\partial_{\bar{z}}\varphi = \frac{1}{2}e^{\varphi}$$

32. *Virasoro algebra:*

$$[L_m, L_n] = (m-n)L_{m+n} + \frac{c}{12}(m^3-m)\delta_{m+n}$$

33. *Poincaré's epigraph to "Sur le problème des trois corps ..."*

Nunquam praescriptos transibunt sidera fines.
(Never will the stars cross their prescribed limits.)

34. *Yang-Mills equations in two notations:*

$$F^a_{\mu\nu} = \partial_\mu A^a_\nu - \partial_\nu A^a_\mu + f_{abc}A^b_\mu A^c_\nu$$
$$\nabla^\mu F^a_{\mu\nu} = 0$$

(or)

$$\partial^\mu F_{\mu\nu} - ig\,[A^\mu, F_{\mu\nu}] = 0$$

$$F = dA + A \wedge A$$
$$\nabla \wedge \star F = 0$$

35. *Yang-Mills Lagrangian*

$$\mathcal{L} = -\frac{1}{4g^2}\mathrm{Tr}\,F^2$$

36. *Hodge Theorem:*

$$H^p(M) = \{\varphi \in \Omega^p(M) \mid d\varphi = 0,\ d \star \varphi = 0\}$$

37. *Dirac Equation:*

$$\begin{aligned} (-i\hbar\gamma^\mu \nabla_\mu + mc)\,\psi &= 0 \\ \gamma^\mu\gamma^\nu + \gamma^\nu\gamma^\mu &= 2g^{\mu\nu} \end{aligned}$$

38. *Dirac Equation (another):*

$$\begin{aligned} (\not{D} + im)\psi &= 0 \\ D &\equiv \partial + ieA \end{aligned}$$

39. *Cauchy's Integral Formula:*

$$f(z) = \frac{1}{2\pi i} \oint_C \frac{f(\zeta)}{\zeta - z}\, d\zeta$$

40. *Hodge Decomposition Theorem:*

$$H^n(X, \mathbb{C}) = \oplus_{p+q=n} H^{p,q}(X)$$

42. *Navier-Stokes equation:*

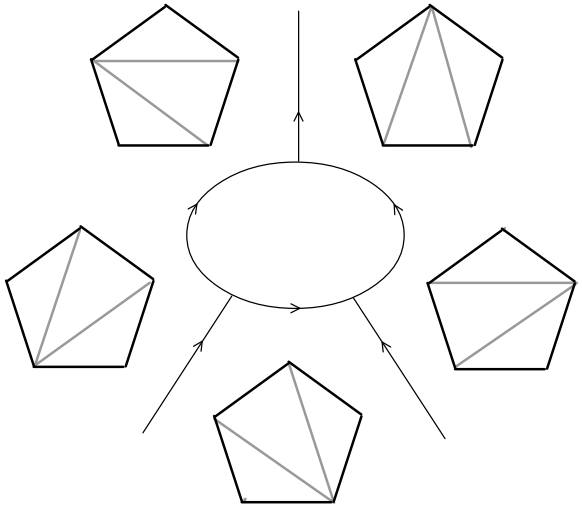
$$\partial_t v_i + v_j \partial_j v_i = -\partial_i p + \nu \partial_j \partial_j v_i$$

43. *Kolmogorov Law:*

$$E(k) \sim \varepsilon^{2/3} k^{-5/3}$$

44. *Hubbard model:*

$$H = -t \sum_{\langle i,j \rangle, \sigma} \left(c^\dagger_{i,\sigma} c_{j,\sigma} + h.c. \right) + U \sum_i n_{i\uparrow} n_{i\downarrow}$$



41. *Pentagon identity of dilogarithm:*

$$Li_2(x) = \int_0^1 \frac{dt}{t} \log(1 - xt)$$

45. *Renormalization:*

$$\beta(g) = \mu \frac{\partial g}{\partial \mu}$$

46. *"no comment"*

$$SU(3) \times SU(2) \times U(1)$$

47. *The entropy formula:*

$$S = -k_B \sum_i p_i \log p_i$$

48. *CKM matrix:*

$$\begin{bmatrix} |V_{ud}| & |V_{us}| & |V_{ub}| \\ |V_{cd}| & |V_{cs}| & |V_{cb}| \\ |V_{td}| & |V_{ts}| & |V_{tb}| \end{bmatrix} = \begin{bmatrix} 0.9742 & 0.2257 & 0.0036 \\ 0.2256 & 0.9733 & 0.0415 \\ 0.0087 & 0.0407 & 0.9991 \end{bmatrix}$$

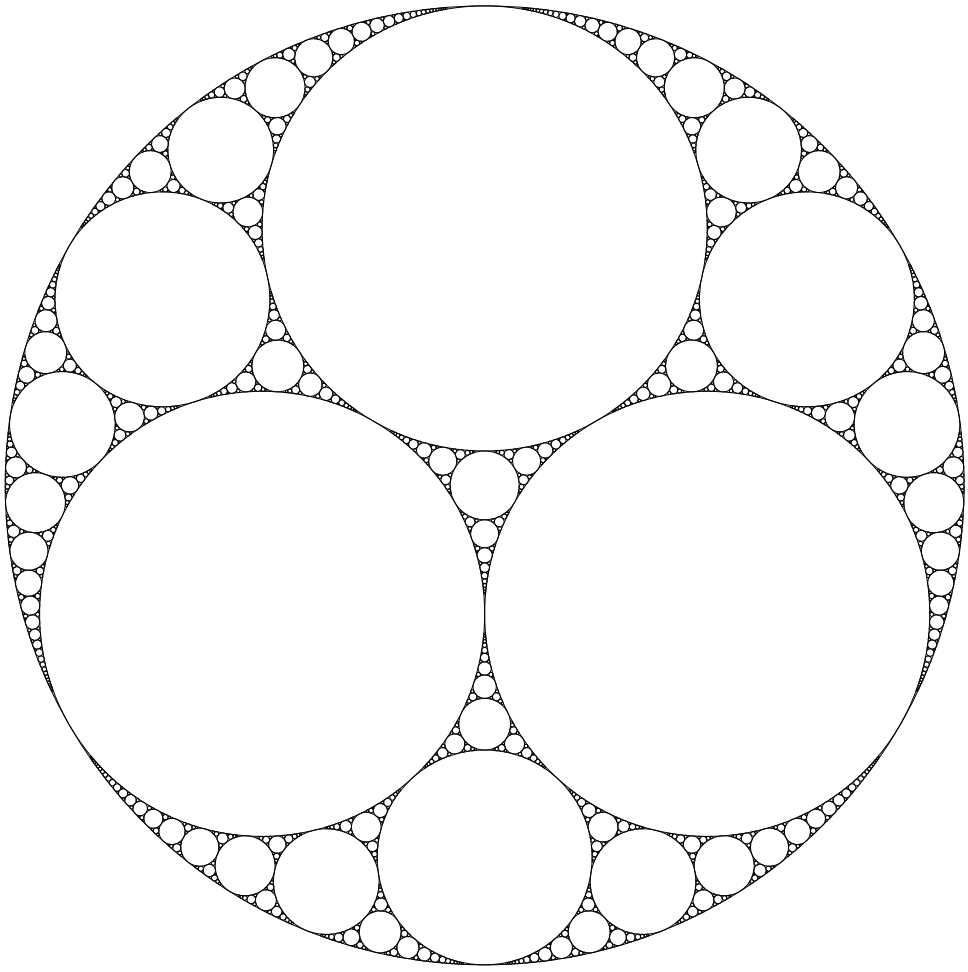
49. *Exact homotopy sequence of Stiefel fibration:*

$$\cdots \to \pi_{i+1}S^n \to \pi_i V_{k-1}\mathbb{R}^n \to \pi_i V_k \mathbb{R}^{n+1} \to \pi_i S^n \to \cdots$$

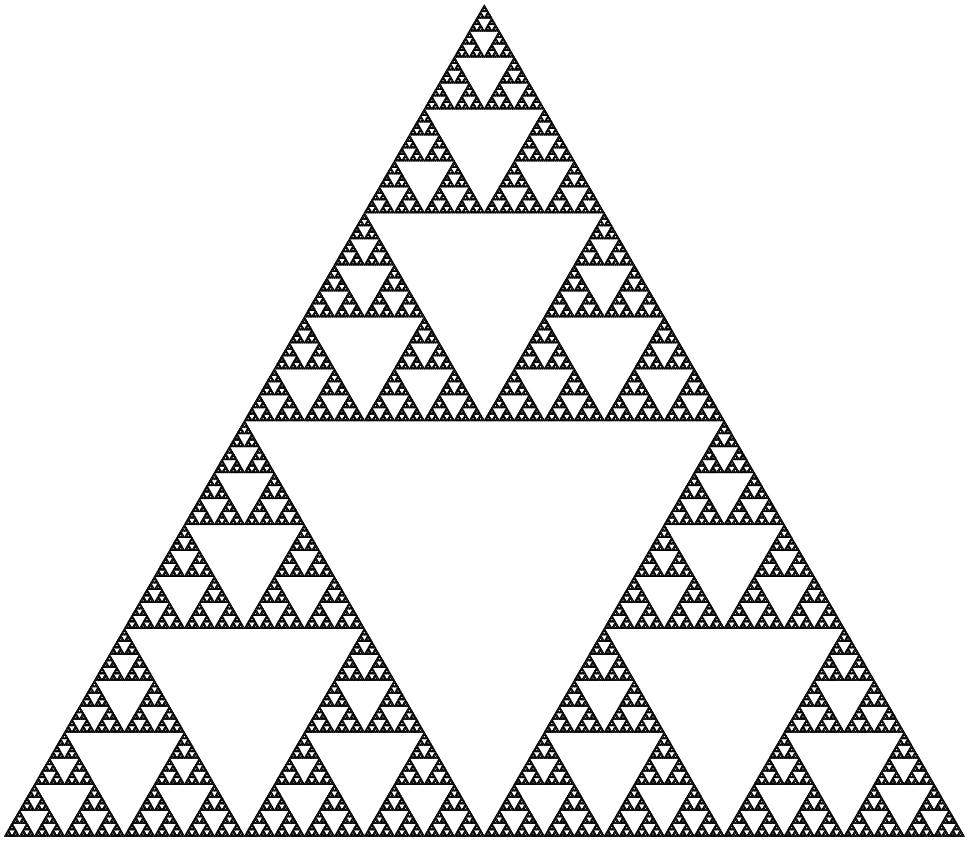
50. *Ricci flow:*

$$\frac{dg_t}{dt} = -2Ric(g_t)$$

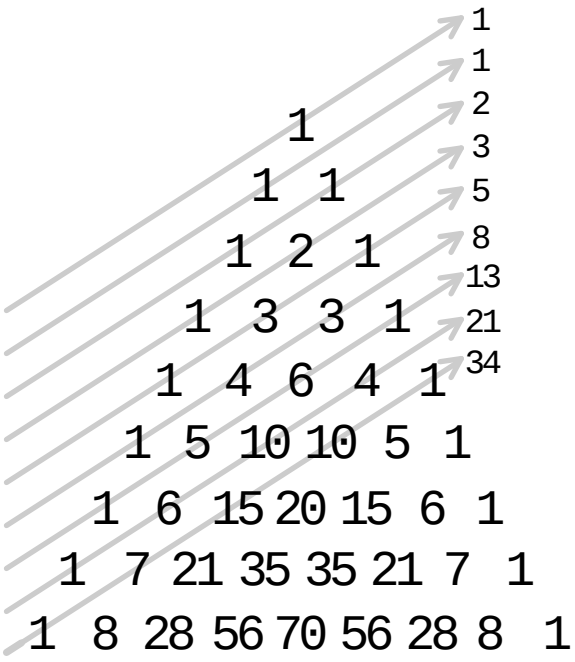
51. *Apollonian fractal:*



52. *Sierpinski gasket:*



53. *Pascal's triangle, Fibonacci numbers:*



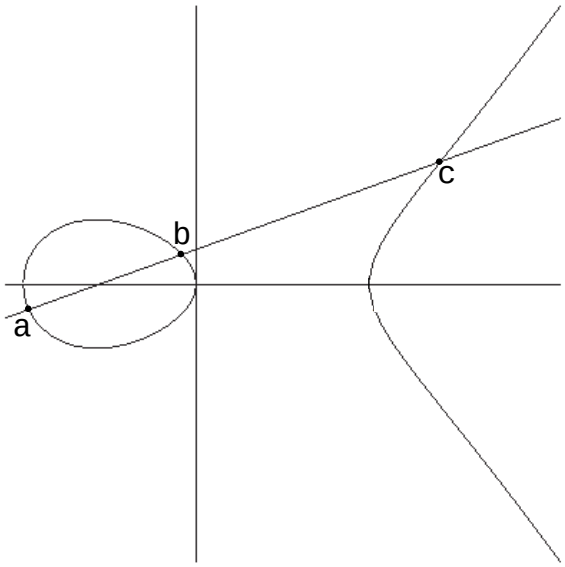
54. *Heat Kernel Version of the Index Theorem:*

$$\text{index}(\not{D}) = \text{Trace}[(-1)^F e^{-\beta H}]$$

55. *Aharonov-Bohm Effect:*

$$e^{iq \oint \vec{A} \cdot d\vec{\ell}} = e^{i2\pi F}$$

56. *Group law on cubic:*

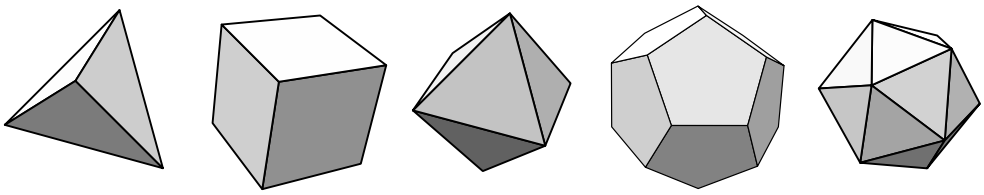


$$\mathsf{a} \cdot \mathsf{b} \cdot \mathsf{c} = 1$$

57. *Riemann-Roch-Hirzebruch:*

$$\sum_{k=0}^{n} (-1)^k \dim H^k(X, E) \quad = \quad \int_X ch\, E \cup Todd(X)$$

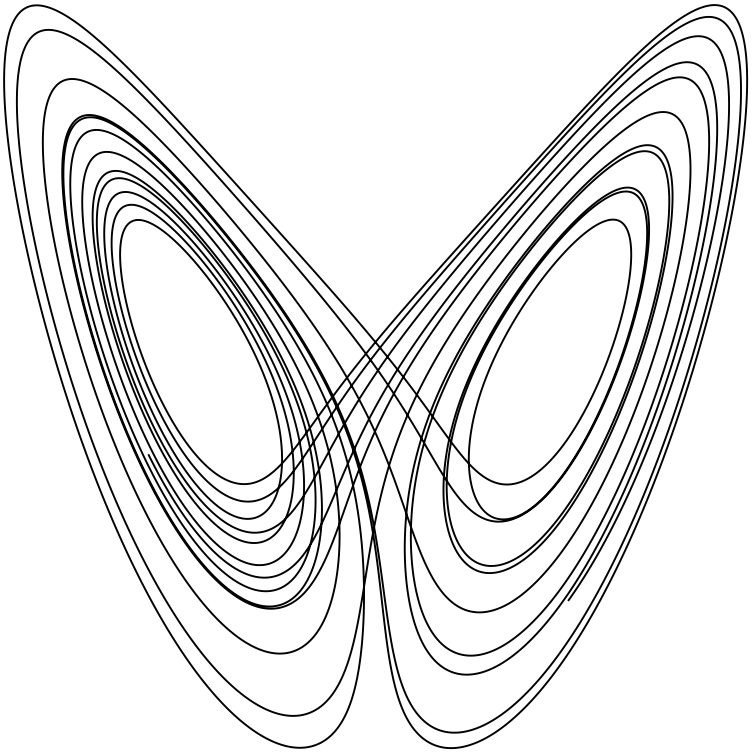
58. *Platonic solids, Euler characteristic:*



$$V - E + F = 2$$

$$\begin{array}{c} V - E \\ + F = 2 \end{array}$$

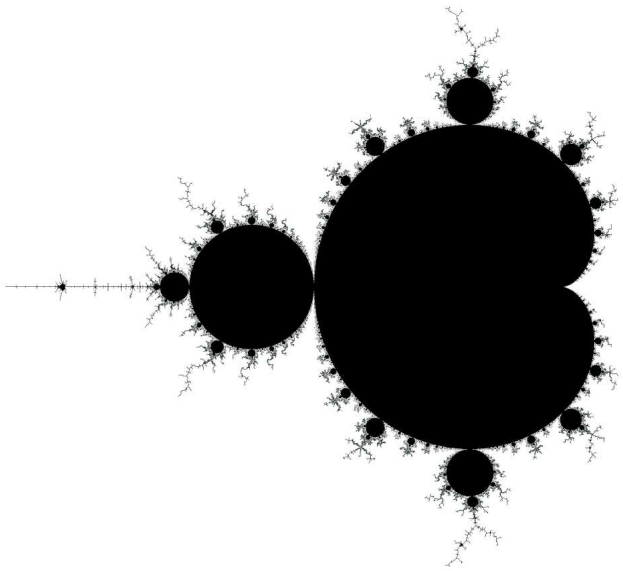
59. *Lorenz attractor:*



60. *Black hole entropy*

$$S_{BH} = \frac{A}{4}$$

61. *Mandelbrot Set:*



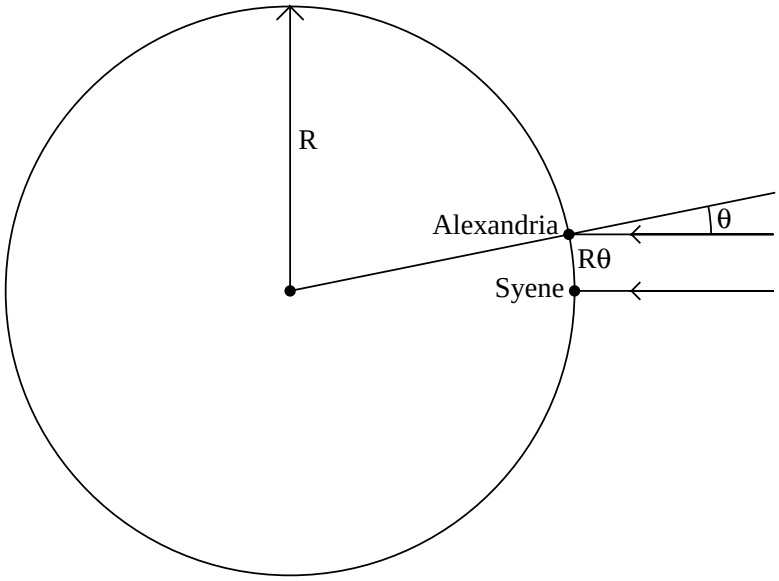
64. *Prime number Theorem:*

$$\pi(n) \sim \frac{n}{\ln(n)}$$

62. *Sonnet by Edna St. Vincent Millay*
Euclid alone has looked on Beauty bare.
Let all who prate of Beauty hold their peace,
And lay them prone upon the earth and cease
To ponder on themselves, the while they stare
At nothing, intricately drawn nowhere
In shapes of shifting lineage; let geese
Gabble and hiss, but heroes seek release
From dusty bondage into luminous air.
O blinding hour, O holy, terrible day,
When first the shaft into his vision shone
Of light anatomized! Euclid alone
Has looked on Beauty bare. Fortunate they
Who, though once only and then but far away,

Have heard her massive sandal set on stone.

63. *Eratosthenes' measurement of radius of Earth:*



65. *Supergravity:*

$$\mathcal{L} = R - \bar{\psi}_\mu \gamma^{\mu\rho\sigma} D_\rho \psi_\sigma$$

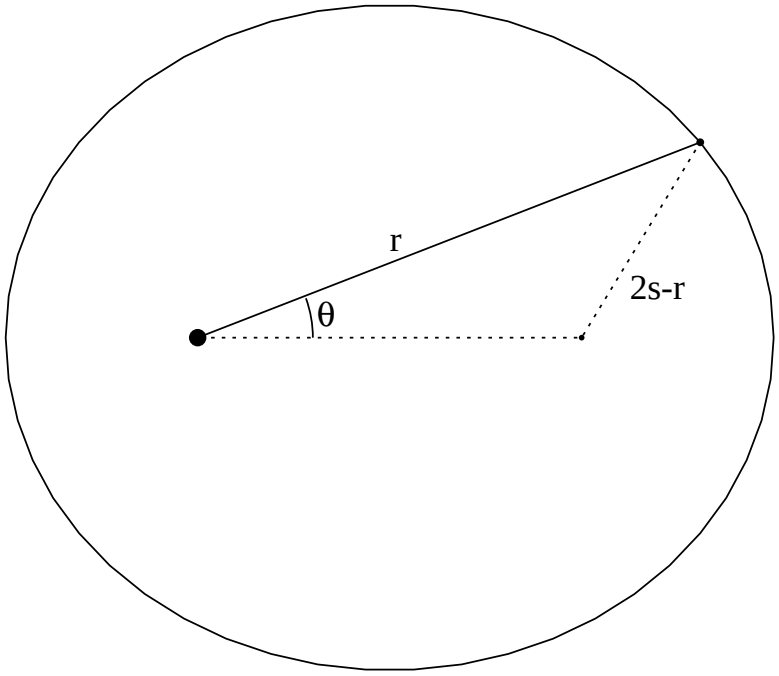
66. *Fourier transform:*

$$\hat{f}(\xi) = \int f(x) e^{2\pi i x \cdot \xi} dx \qquad\qquad f(x) = \int \hat{f}(\xi) e^{-2\pi i x \cdot \xi} d\xi$$

67. *Euler's summation for $\zeta(2)$:*

$$1 + \frac{1}{4} + \frac{1}{9} + \cdots = \frac{\pi^2}{6}$$

68. *Kepler's laws:*



$$r\ d\theta/dt = \text{constant}, \qquad \oint dt \propto s^{3/2}$$