

Alexa[x_] := x^10 + x^9 + 2 x^8 + 3 x^7 + 5 x^6 + 8 x^5 + 8 x^4 + 5 x^3 + 3 x^2 + 2 x + 1

Alexa[1]

39

Alexa[2]

3193

Alexa[3]

104821

Alexa[1]

39

Alexa[100]

101 020 305 080 805 030 201

Class[x_] := 1 + 2 x + 3 x^2 + 5 x^3 + 8 x^4 + 8 x^5 + 5 x^6 + 3 x^7 + 2 x^8 + x^9 + x^10

Class[x]

$1 + 2x + 3x^2 + 5x^3 + 8x^4 + 8x^5 + 5x^6 + 3x^7 + 2x^8 + x^9 + x^{10}$

Alexa[x]

$1 + 2x + 3x^2 + 5x^3 + 8x^4 + 8x^5 + 5x^6 + 3x^7 + 2x^8 + x^9 + x^{10}$

phi = (1 + Sqrt[5]) / 2

$\frac{1}{2} (1 + \sqrt{5})$

phi^2

$\frac{1}{4} (1 + \sqrt{5})^2$

Expand[phi^2]

$\frac{3}{2} + \frac{\sqrt{5}}{2}$

psi = (1 - Sqrt[5]) / 2

$\frac{1}{2} (1 - \sqrt{5})$

Expand[psi^2]

$\frac{3}{2} - \frac{\sqrt{5}}{2}$

F[n_] := 5^(-1/2) phi^n - 5^(-1/2) psi^n

F[1]

$-\frac{1 - \sqrt{5}}{2\sqrt{5}} + \frac{1 + \sqrt{5}}{2\sqrt{5}}$

Table[F[n], {n, 1, 10}]

$$\left\{ -\frac{1-\sqrt{5}}{2\sqrt{5}} + \frac{1+\sqrt{5}}{2\sqrt{5}}, -\frac{(1-\sqrt{5})^2}{4\sqrt{5}} + \frac{(1+\sqrt{5})^2}{4\sqrt{5}}, \right.$$

$$-\frac{(1-\sqrt{5})^3}{8\sqrt{5}} + \frac{(1+\sqrt{5})^3}{8\sqrt{5}}, -\frac{(1-\sqrt{5})^4}{16\sqrt{5}} + \frac{(1+\sqrt{5})^4}{16\sqrt{5}}, -\frac{(1-\sqrt{5})^5}{32\sqrt{5}} + \frac{(1+\sqrt{5})^5}{32\sqrt{5}},$$

$$-\frac{(1-\sqrt{5})^6}{64\sqrt{5}} + \frac{(1+\sqrt{5})^6}{64\sqrt{5}}, -\frac{(1-\sqrt{5})^7}{128\sqrt{5}} + \frac{(1+\sqrt{5})^7}{128\sqrt{5}}, -\frac{(1-\sqrt{5})^8}{256\sqrt{5}} + \frac{(1+\sqrt{5})^8}{256\sqrt{5}},$$

$$\left. -\frac{(1-\sqrt{5})^9}{512\sqrt{5}} + \frac{(1+\sqrt{5})^9}{512\sqrt{5}}, -\frac{(1-\sqrt{5})^{10}}{1024\sqrt{5}} + \frac{(1+\sqrt{5})^{10}}{1024\sqrt{5}} \right\}$$

Simplify[Table[F[n], {n, 1, 10}]]

{1, 1, 2, 3, 5, 8, 13, 21, 34, 55}

Simplify[F[n]]

$$\frac{-\left(\frac{1}{2}(1-\sqrt{5})\right)^n + \left(\frac{1}{2}(1+\sqrt{5})\right)^n}{\sqrt{5}}$$

MP[x_] := (1) + (-2) x + (14) x (x - 1) / 2 + (12) x (x - 1) (x - 2) / 6

Expand[MP[x]]

1 - 5 x + x² + 2 x³

Table[MP[x], {x, 0, 7}]

{1, -1, 11, 49, 125, 251, 439, 701}