Aritm. lukujono

- $a_1 \;,\; a_1+d \;,\; a_1+2d \;,\; \dots \;,\; \boxed{a_n = a_1 + (n-1)d}$

  $a_1 \xrightarrow{+d} a_1+d \xrightarrow{+d} a_1+2d$

- jono aritm. jos $\boxed{d = a_{n+1} - a_n = \text{vakio}}$

729. $a_3 = 93 \;,\; a_{10} = 91$

$$\rightarrow \begin{cases} 93 = a_1 + (3-1)\cdot d \\ 91 = a_1 + (10-1)\cdot d \end{cases} \rightarrow \begin{cases} 93 = a_1 + 2d \\ -91 = -a_1 - 9d \quad \| \cdot(-1) \end{cases}$$

$+$

$$2 = -7d \rightarrow d = -\frac{2}{7}$$

$$a_1 = 93 - 2d = 93 + \frac{4}{7}$$

$$93 + \frac{4}{7} + (n-1)\cdot\left(-\frac{2}{7}\right) > 0$$

$$\vdots \quad n < 329$$

V: 328 termiä

Geom. lukujono

- $a_1, \quad a_1 q, \quad a_1 q^2, \quad a_1 q^3, \ldots, \quad \boxed{a_n = a_1 q^{n-1}}$

$$a_1 \xrightarrow{\cdot q} a_1 q \xrightarrow{\cdot q} a_1 q^2 \xrightarrow{\cdot q} a_1 q^3$$

- Onko jono geom.? $\boxed{q = \dfrac{a_{n+1}}{a_n}} = \text{vakio}$

- Kantaluvun ratkaiseminen

$$a_n = a_1 \cdot q^{n-1} \quad \| : a_1$$

$$\frac{a_n}{a_1} = q^{n-1} \quad \| \sqrt[n-1]{}$$

$$\boxed{q = \sqrt[n-1]{\frac{a_n}{a_1}}}$$

- eksponentin ratkaiseminen

$$a_n = a_1 \cdot q^{n-1} \quad \| : a_1$$

$$q^{n-1} = \frac{a_n}{a_1} \quad \| \log$$

$$n-1 = \frac{\log\left(\frac{a_n}{a_1}\right)}{\log q}$$

$$\boxed{n = \frac{\log\left(\frac{a_n}{a_1}\right)}{\log q} + 1}$$

Esim. Geom. jono

$$2, \underset{q}{\curvearrowright} 6, \curvearrowright 18, \ldots$$

$$q = \frac{18}{6} = 3$$

$$\boxed{a_n = 2 \cdot 3^{n-1}}$$

Monesko termi ylittää 100000?

$$2 \cdot 3^{n-1} = 100000 \quad || :2$$

$$3^{n-1} = 50000 \quad || \log$$

$$n-1 = \frac{\log 50000}{\log 3} = 9,85 \rightarrow n = 10,85$$

$a_{10} = 2 \cdot 3^9 \approx 39400$

$a_{11} = 2 \cdot 3^{10} \approx 11800$

V: 11. termi

737. $a_n = \dfrac{3^{n-1}}{7^{2n}}$, $n = 1, 2, 3, \ldots$

a) $a_1 = \dfrac{3^0}{7^2} = \dfrac{1}{49}$ $\quad a_4 = \dfrac{27}{7^8}$

$a_2 = \dfrac{3^1}{7^4} = \dfrac{3}{7^4}$

$a_3 = \dfrac{9}{7^6}$

$\boxed{a_n = a_1 q^{n-1}}$

b) $\boxed{q = \dfrac{a_{n+1}}{a_n}} = \dfrac{\dfrac{3^{(n+1)-1}}{7^{2(n+1)}}}{\dfrac{3^{n-1}}{7^{2n}}} = \dfrac{\dfrac{3^n}{7^{2n+2}}}{\dfrac{3^{n-1}}{7^{2n}}}$

$\dfrac{3^n}{7^{2n+2}} \cdot \dfrac{7^{2n}}{3^{n-1}} = 3^{n-(n-1)} \cdot 7^{2n-(2n+2)}$

$= 3^1 \cdot 7^{-2} = \dfrac{3}{49}$

Vakio $\Rightarrow$

on geom. jono

s. 125:

734, 735, 736

740, 738

734. $q = \frac{x}{2} = \frac{8}{x} \rightarrow x = \pm 4$

$\rightarrow q = \frac{\pm 4}{2} = \pm 2$

$\rightarrow a_n = 2 \cdot 2^{n-1} = 2^n$

tai

$a_n = 2 \cdot (-2)^{n-1}$

$a_6 = 2^6$ tai $a_6 = 2 \cdot (-2)^5$

$= 64$ $\quad\quad = -64$

736. $\begin{cases} a_4 = 24 = a_1 q^3 & \longrightarrow a_1 = \dfrac{24}{q^3} \\ a_{11} = 3072 = a_1 q^{10} \end{cases}$

$\longrightarrow \quad 3072 = \dfrac{24}{q^3} \cdot q^{10} = 24q^7 \quad \| :24 \rightarrow q^7 = 128 \rightarrow$

$q = \sqrt[7]{128} = 2 \longrightarrow \quad a_1 = \dfrac{24}{8} = 3 \quad \longrightarrow \quad a_n = 3 \cdot 2^{n-1}$