

$$a_1, a_2, a_3, a_4$$

$$4, 8, 16, 32, 64$$

$\cdot 2$ $\cdot 2$ $\cdot 2$ $\cdot 2$

$$q = \frac{a_{n+1}}{a_n}$$

$$\frac{8}{4} = 2$$

$$\frac{16}{8} = 2$$

$$\frac{32}{16} = 2$$

⋮

$$a_1 = 4$$

$$a_2 = 4 \cdot 2$$

$$a_3 = 4 \cdot 2 \cdot 2 = 4 \cdot 2^2$$

$$a_4 = 4 \cdot 2 \cdot 2 \cdot 2 = 4 \cdot 2^3$$

⋮

$$a_n = 4 \cdot 2^{n-1}$$

$$a_8 = 4 \cdot 2^{8-1} = 4 \cdot 2^7 = 4 \cdot 2^7 = 512$$

yleinen jäsen

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

13.2

S.128

$$10, 50, 250, \dots$$

$\cdot 5$ $\cdot 5$ $\cdot 5$

geometrisen jono

a) suhdeluku $q = \frac{50}{10} = 5$

b) $a_4 = 10 \cdot 5^3 = 1250$

13.3

a) 3, 7, 11, ...

differenssi $7 - 3 = 4$
 $11 - 7 = 4$

Voi olla aritmeettinen

b) -5, -25, -125, ... suhdeluku $\frac{-25}{-5} = 5$

Voi olla geometrisen

$$\frac{-125}{-25} = 5$$

c) 2, 4, 16, ...

$+2$ $+12$
 $\cdot 2$ $\cdot 4$

ei kumpikaan

Geometrisen summa

14.1

S.137

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

$$a_n = 3 \cdot 4^{n-1}$$

a_1 q

$$3, 12, 48, \dots$$

$$S_n = a_1 \cdot \frac{1 - q^n}{1 - q}$$

S.137

$$a_n = 3 \cdot 4^{n-1}$$

$$3, 12, 48, \dots$$

Laske seitsemän jäsenen summa
 $n=7$

$$a_7 = 3 \cdot 4^6 = 12288$$

$$S_7 = 3 \cdot \frac{1-4^7}{1-4} = \frac{3 \cdot (1-4^7)}{1-4} = 16383$$

14.3

a) $5, 25, 125, \dots$

8 ensimmäisen jäsenen summa

$$5 + 25 + 125, \dots$$

$$q = \frac{25}{5} = 5$$

$$a_1 = 5$$

$$n = 8$$

$$S_8 = 5 \cdot \frac{1-5^8}{1-5} = \frac{5 \cdot (1-5^8)}{1-5} = 488280$$

b) $-4, 12, -36, \dots$

$$q = \frac{12}{-4} = -3$$

$$a_1 = -4$$

$$n = 5$$

$$S_5 = -4 \cdot \frac{1-(-3)^5}{1-(-3)}$$

$$\frac{-4 \cdot (1-(-3)^5)}{1+3} = -244$$

14.6

geometrisen jono
 $a_1 = 5000$

$$a_2 = 2500$$

$$q = \frac{2500}{5000} = \frac{1}{2} = 0,5$$

$$S_7 = 5000 \cdot \frac{1-0,5^7}{1-0,5} = \frac{5000 \cdot (1-0,5^7)}{1-0,5} = 9921,875$$