$$\Leftrightarrow \quad n-1 = \frac{\ln 2187}{\ln 3} \quad \Leftrightarrow n = \frac{\ln 2187}{\ln 3} + 1 = 8 \quad \checkmark \quad \Rightarrow \underline{8.\ \text{jäsen}}$$

TAI: $3^{n-1} = 2187 \quad \Leftrightarrow n-1 = \log_3 2187 \quad \Leftrightarrow n = \log_3 2187 + 1 = 8$

TAI: $-2\cdot(-3)^{n-1} = 4374$, kokeilemalla: $n = 8$

5.4 a) $\displaystyle\sum_{n=1}^{15} 3^n = 3^1 \overset{\cdot 3}{+} 3^2 \overset{\cdot 3}{+} 3^3 + \ldots + 3^{15} = \frac{3\cdot(1-3^{15})}{1-3} = \underline{21\ 523\ 359}$

b) $\displaystyle\sum_{n=12}^{20} 3^n = 3^{12} \overset{\cdot 3}{+} 3^{13} \overset{\cdot 3}{+} 3^{14} + \ldots + 3^{20} = \frac{3^{12}\cdot(1-3^{20-12+1})}{1-3} = \underline{5\ 279\ 910\ 881}$

5.6 $$8 + 8\cdot 1{,}2 + 8\cdot 1{,}2^2 + 8\cdot 1{,}2^3 + \ldots + \underbrace{8\cdot 1{,}2^{n-1}}_{n.\ \text{jäsen}} = \frac{8\cdot(1-1{,}2^n)}{1-1{,}2} < 1\ 000\ 000 \quad \overbrace{\quad}^{1\cdot(-0{,}2)<0}$$

$\Leftrightarrow \quad 8\cdot(1-1{,}2^n) > -200\ 000 \quad \mid :8 > 0$ (*)

$\Leftrightarrow \quad 1-1{,}2^n > -25\ 000$

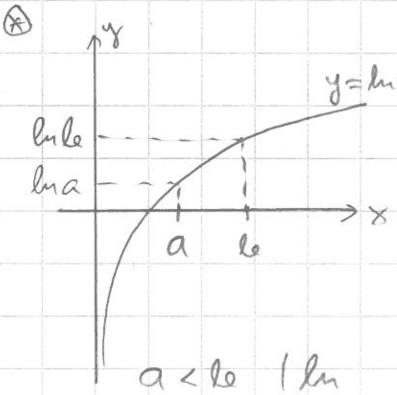
$\Leftrightarrow \quad 25\ 001 > 1{,}2^n \quad \mid \ln$ (*)

$\Leftrightarrow \quad \ln(25\ 001) > \ln 1{,}2^n$

$\Leftrightarrow \quad \ln(25\ 001) > n \ln 1{,}2 \quad \mid \ln 1{,}2 > 0$

$\Leftrightarrow \quad \underbrace{\frac{\ln 25\ 001}{\ln 1{,}2}}_{55{,}54} > n \quad \Rightarrow \underline{55}$

(*)



$a < b \quad \mid \ln$

$\Leftrightarrow \ln a < \ln b$

$\ln x$ aidosti kasvava

$\rightarrow$ järjestys säilyy

5.8 a) $3 \overset{\cdot 2}{,} 6 \overset{\cdot \frac{3}{2}}{,} 9, 12, \ldots \quad \Rightarrow \underline{\text{ei}}$

b) $5 \overset{\cdot(-1)}{,} -5 \overset{\cdot(-1)}{,} 5 \overset{\cdot(-1)}{,} -5, \ldots \quad \Rightarrow \underline{\text{voi olla}}$

c) $2 \overset{\cdot 0}{,} 0 \overset{\cdot ?}{,} 2, 0, \ldots \quad \Rightarrow \underline{\text{ei}}$

d) $5 \overset{\cdot 2}{,} 10 \overset{\cdot 2}{,} 20 \overset{\cdot 2}{,} 40, \ldots \quad \Rightarrow \underline{\text{voi olla}}$

e) $1 \overset{\cdot \frac{3}{2}}{,} \frac{3}{2} \overset{\cdot \frac{3}{2}}{,} \frac{9}{4} \overset{\cdot \frac{3}{2}}{,} \frac{27}{8}, \ldots \quad \Rightarrow \underline{\text{voi olla}}$

f) $12 \overset{\cdot \frac{1}{2}}{,} 6 \overset{\cdot 2}{,} 12, 6, \ldots \quad \Rightarrow \underline{\text{ei}}$