$\Leftrightarrow x(x-5) = 6 \quad \Leftrightarrow x^2 - 5x - 6 = 0$ $\quad \begin{cases} a = 1 \\ b = -5 \\ c = -6 \end{cases}$

$\Leftrightarrow x = \dfrac{-(-5) \pm \sqrt{(-5)^2 - 4 \cdot 1 \cdot (-6)}}{2 \cdot 1} = \dfrac{5 \pm \sqrt{49}}{2} = \dfrac{5 \pm 7}{2} = \begin{cases} 6 \\ -1 \end{cases}$ ↓

Vast. $x = 6$ ↓

b) $2\lg(x-1) + \lg 4 = 0$ $\quad x - 1 > 0 \Leftrightarrow x > 1$

$\Leftrightarrow \lg(x-1)^2 + \lg 4 = 0$

$\Leftrightarrow \lg(x^2 - 2 \cdot x \cdot 1 + 1^2) + \lg 4 = 0$

$\Leftrightarrow \lg((x^2 - 2x + 1) \cdot 4) = 0$

$\Leftrightarrow \lg(4x^2 - 8x + 4) = 0 \quad | 10^{(\,)}$

$\Leftrightarrow 10^{\lg(4x^2 - 8x + 4)} = 10^0$

$\Leftrightarrow 4x^2 - 8x + 4 = 1 \quad \Leftrightarrow 4x^2 - 8x + 3 = 0 \quad \Leftrightarrow x = \begin{cases} \frac{1}{2} \\ \frac{3}{2} \end{cases}$ ↓

Vast. $x = \frac{3}{2}$

13.8

13.15 $q(x) = x(\log_5 \underbrace{x}_{>0})^2 - x \log_5 \underbrace{x^3}_{>0} = 0, \quad x > 0$

$\Leftrightarrow x\left((\log_5 x)^2 - \log_5 x^3\right) = 0$

$\Leftrightarrow x = 0$ ↓ tai $(\log_5 x)^2 - \log_5 x^3 = 0$

$\Leftrightarrow (\log_5 x)^2 - 3\log_5 x = 0$

$\Leftrightarrow \log_5 x\,(\log_5 x - 3) = 0$

$\Leftrightarrow \log_5 x = 0 \;|5^{(\,)}$ tai $\log_5 x - 3 = 0$

$\Leftrightarrow x = 5^0 = 1$ ↓ $\quad \Leftrightarrow \log_5 x = 3 \;|5^{(\,)}$

$\Leftrightarrow x = 5^3 = 125$ ↓

Vast. $x = 1$ tai $x = 125$

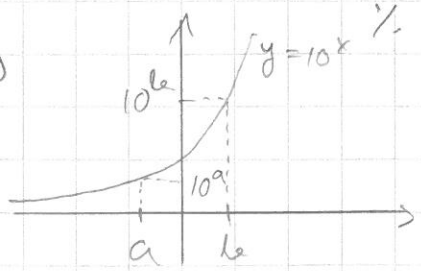
13.18 a) $\lg(\underbrace{x^2}_{\geq 0} + 100) \leq 3 \quad | 10^{(\,)}$ $\quad \overset{x \in \mathbb{R}}{\underset{(*)}{\Rightarrow}}$

$\Leftrightarrow 10^{\lg(x^2 + 100)} \leq 10^3$

$\Leftrightarrow x^2 + 100 \leq 1000 \quad \Leftrightarrow x^2 - 900 \leq 0$

Vastaava yhtälö: $x^2 - 900 = 0$

$\Leftrightarrow x^2 = 900 \;(\sqrt{\ }) \Leftrightarrow x = \pm 30$



$a \leq b \quad | 10^{(\,)}$

$10^a \leq 10^b$ $\quad (10 > 1)$

10^x on aidosti kasvava

→ järjestys säilyy