

Matematiikan perusteet taloustieteilijöille I

Harjoitus 5, syksy 2010

1. Ratkaise yhtälöparit

$$\text{a) } \begin{cases} -x - y + 2 = 0 \\ 2x + 2y - 4 = 0 \end{cases}$$

Vast: $\forall x \in \mathbb{R}$

$$\text{b) } \begin{cases} 3x - 4y + 7 = 0 \\ 6x - 2y - 3 = 0 \end{cases}$$

Vast: $x = \frac{13}{9}, y = \frac{17}{6}$

$$\text{c) } \begin{cases} 2x + y - 3 = 0 \\ 4x + 2y - 5 = 0 \end{cases}$$

Vast: ei ratk.

$$\text{d) } \begin{cases} y = \frac{x}{20} + 1 \\ x = 32 - 4y - y^2 \end{cases}$$

Vast: $(20, 2)$ tai $(-540, -26)$.

2. Ratkaise

$$\text{a) } 3^{-x^2} = (\sqrt[4]{3})^{-5x+1}$$

Vast: $x = 1 \vee x = \frac{1}{4}$

$$\text{b) } 2 \log_5(x+1) = 1$$

Vast: $x = \sqrt{5} - 1$

$$\text{c) } \frac{3^{2x-3}}{\sqrt{2}} < \frac{1}{\sqrt{54}}$$

Vast: $x < \frac{3}{4}$

$$\text{d) } 2^{2x} + 1 \leq 2^{x+1}$$

Vast: $x = 0$.

3. Ratkaise

$$\text{a) } \log_{10}(x^2 - 1) = 1 + \log_{10}(x - 1)$$

Vast: $x = 9$

$$\text{b) } 2^{x^2} = 3^{2x}$$

Vast: $x = 0 \vee x = \log_2 9$

$$\text{c) } \log_2(2x) = \log_4(3x)$$

Vast: $x = \frac{3}{4}$

$$\text{d) } \log_{\frac{1}{2}}(2x - 1) + 2 > \log_{\frac{1}{2}}(3x - 4)$$

Vast: $x > \frac{3}{2}$

$$\text{e) } \log_{\frac{1}{2}}(2x) < \log_2 7$$

Vast: $x > \frac{1}{14}$

$$\text{f) } 2^{x^2} < 3^{2x}$$

Vast: $0 < x < \log_2 9$

$$\text{g) } \log_2(2x) = \log_3 x$$

Vast: $x = {}^{\log_2 3 - 1} \sqrt{\frac{1}{3}}$.