

## 8. Weliöjuuri

Esim

a)  $x^2 = 25 \quad | \sqrt{\quad} \Leftrightarrow x = 5 \text{ tai } x = -5 \quad (x = \pm 5)$   
b)  $x^2 = 2 \quad | \sqrt{\quad} \Leftrightarrow x = \sqrt{2} \text{ tai } x = -\sqrt{2} \quad (x = \pm \sqrt{2})$   
c)  $\underbrace{x^2}_{\geq 0 \text{ aina}} = -1 \quad \downarrow \Rightarrow \text{ei ratkaisua}$

yleisesti yhtälön  $x^2 = a$  ratkaisun

1°  $a > 0$  :  $x = \pm \sqrt{a}$   
2°  $a = 0$  :  $x = 0$   
3°  $a < 0$  : ei ratk.

Määritelmä  $\sqrt{a} = b \Leftrightarrow \begin{cases} 1^\circ b^2 = a \\ 2^\circ b \geq 0 \end{cases}$

8.2 a)  $\sqrt{9} = 3$   $\left( \begin{array}{l} 1^\circ 3^2 = 9\% \\ 2^\circ 3 \geq 0\% \end{array} \right)$   
b)  $\sqrt{1} = 1$   $\left( \begin{array}{l} 1^\circ 1^2 = 1\% \\ 2^\circ 1 \geq 0\% \end{array} \right)$   
c)  $\sqrt{0} = 0$   
d)  $\sqrt{100} = 10$   $\left( \begin{array}{l} 1^\circ 10^2 = 100\% \\ 2^\circ 10 \geq 0\% \end{array} \right)$

8.3 a)  $-\sqrt{25} = -5$   
b)  $\sqrt{-25}$  ei ole määritelty koska  $-25 < 0$   
c)  $12 - \sqrt{16} = 12 - 4 = 8$

8.4 a)  $\sqrt{100 - 36} = \sqrt{64} = 8$   
b)  $\sqrt{100} - \sqrt{36} = 10 - 6 = 4$   
c)  $(\sqrt{49})^2 = 49$   
d)  $(-\sqrt{49})^2 = (\sqrt{49})^2 = 49$

8.14 a)  $\sqrt{4 + 9 + 36} = \sqrt{49} = 7$   
b)  $\sqrt{4} + \sqrt{9} + \sqrt{36} = 2 + 3 + 6 = 11$   
c)  $\sqrt{9 \cdot 16} = \sqrt{144} = 12$   
d)  $\sqrt{9} \cdot \sqrt{16} = 3 \cdot 4 = 12$

8.15 a)  $x^2 = 49 \quad | \sqrt{\quad} \Leftrightarrow x = \pm \sqrt{49} = \pm 7$   
b)  $5x^2 = 125 \quad | :5 \Leftrightarrow x^2 = 25 \quad | \sqrt{\quad} \Leftrightarrow x = \pm \sqrt{25} = \pm 5$   
c)  $3x^2 + 12 = 0 \quad \Leftrightarrow 3x^2 = -12 \quad | :3 \Leftrightarrow \underbrace{x^2}_{\geq 0} = -4 \quad \downarrow \text{ei ratk.}$   
d)  $2x^2 - 1 = 9 \quad \Leftrightarrow 2x^2 = 10 \quad | :2 \Leftrightarrow x^2 = 5 \quad | \sqrt{\quad} \Leftrightarrow x = \pm \sqrt{5}$