

Neliöjuuri

Yleinen juuri

Polynomien jako tekijöihin

Toisen asteen yhtälö

Korkeamman asteen yhtälö

Kaavat

1. $(\sqrt{a})^2 = a$

3. $\sqrt{a^2} = |a|$

5. $\sqrt{ab} = \sqrt{a}\sqrt{b}$

2. $(\sqrt{a})^{2k} = a^k$

4. $\sqrt{\frac{a}{b}} = \frac{\sqrt{a}}{\sqrt{b}}$

6. $\sqrt{a^2b} = |a|\sqrt{b}$

Esim. $(\sqrt{17})^2 = 17$

Esim. $\sqrt{(-3)^2} = \sqrt{9} = 3 = |-3|$

Esim. $\sqrt{25 \cdot 36} = \sqrt{25} \cdot \sqrt{36} = 5 \cdot 6 = 30$ | Sievennä $\sqrt{45} = \sqrt{9} \sqrt{5} = 3\sqrt{5}$

Esim. $\sqrt{4+9} = \sqrt{13} \neq 2+3$!!!

b) $\frac{\sqrt{2} \sqrt{27}}{\sqrt{3}} = \frac{\sqrt{2} \sqrt{9 \cdot 3}}{\sqrt{3}} = \frac{\sqrt{2} \sqrt{9} \sqrt{3}}{\sqrt{3}} = 3\sqrt{2}$

Esim. $\sqrt{\frac{16}{9}} = \frac{\sqrt{16}}{\sqrt{9}} = \frac{4}{3}$

Esim. $5\sqrt{2} + 3\sqrt{5} - (2\sqrt{2} + \sqrt{5}) = 5\sqrt{2} + 3\sqrt{5} - 2\sqrt{2} - \sqrt{5} = 3\sqrt{2} + 2\sqrt{5}$

Esim. $(\sqrt{5} - 2\sqrt{2})^2 = (\sqrt{5})^2 - 2\sqrt{5} \cdot 2\sqrt{2} + (2\sqrt{2})^2 = 5 - 4\sqrt{5 \cdot 2} + 4 \cdot 2 = 13 - 4\sqrt{10}$
 $(a-b)^2 = a^2 - 2ab + b^2$

6.16 Osoita, että

~~CAS~~ a) $\sqrt{28-10\sqrt{3}} = 5-\sqrt{3}$

b) $\sqrt{5-2\sqrt{6}} = \sqrt{3}-\sqrt{2}$.

a) $\sqrt{28-10\sqrt{3}} = 5-\sqrt{3}$

Siisennytään: $(5-\sqrt{3})^2 = 5^2 - 2 \cdot 5 \cdot \sqrt{3} + (\sqrt{3})^2 = 25 - 10\sqrt{3} + 3 = 28 - 10\sqrt{3}$

$$(a-b)^2 = a^2 - 2ab + b^2$$

on sama luku kuin
juuren alla

sinäkin $5-\sqrt{3} > 0$

$3,267 > 0$

TAI $5-\sqrt{3} = \sqrt{25}-\sqrt{3} > 0$ sillä $25 > 3$

Määritelmä

\sqrt{a} on sellainen ei-negatiivinen luku, jonka neliö on a .

$$\sqrt{a} = b \Leftrightarrow b^2 = a \text{ ja } b \geq 0$$

CASIO LLA

TARKKA

expand(($\sqrt{3}-2$)²)

$-4 \cdot \sqrt{3} + 7$

($\sqrt{3}-2$)²

DESIM.

0.07179676972

6.14 Sievennä ilman laskinta.

~~CAS~~ a) $\sqrt{18} + \sqrt{32} - \sqrt{6} \cdot \sqrt{2}$

b) $3\sqrt{2} \cdot (4\sqrt{5} - 2\sqrt{10})$

c) $(\sqrt{5} + \sqrt{2})^2$

a) $\sqrt{9} \cdot \sqrt{2} + \sqrt{16} \cdot \sqrt{2} - \sqrt{12} = 3\sqrt{2} + 4\sqrt{2} - \sqrt{4} \cdot \sqrt{3}$
 $= \underline{\underline{7\sqrt{2} - 2\sqrt{3}}}$

6.20 Sievennä.

~~CAS~~ a) $\frac{3\sqrt{2} + \sqrt{8}}{\sqrt{2}}$

b) $\frac{\sqrt{3}}{2} + \frac{\sqrt{3}}{4} - \frac{\sqrt{3}}{1} = \frac{2\sqrt{3}}{4} + \frac{\sqrt{3}}{4} - \frac{4\sqrt{3}}{4} = -\frac{\sqrt{3}}{4}$

c) $\frac{\sqrt{50}}{4} + \frac{\sqrt{72}}{8}$

6.23 Sievennä, kun $a > 0$.

~~CAS~~ a) $\sqrt{12a} \cdot \sqrt{3a}$

b) $\frac{a}{\sqrt{a}}$

c) $\frac{\sqrt{5a} \cdot \sqrt{10a^5}}{\sqrt{2a}} = \frac{\sqrt{50 \cdot a^6}}{\sqrt{2} \sqrt{a}} = \frac{\sqrt{25 \cdot 2} \cdot \sqrt{a^2} \cdot \sqrt{a^2} \cdot \sqrt{a^2}}{\sqrt{2} \sqrt{a}} = \frac{5a^3}{\sqrt{a}} = \frac{5a^2 \sqrt{a} \sqrt{a}}{\sqrt{a}} = 5a^2 \sqrt{a}$

$\frac{3}{\sqrt{3}} = \frac{(\sqrt{3})^2}{\sqrt{3}} = \frac{\sqrt{3} \cdot \sqrt{3}}{\sqrt{3}} = \underline{\underline{\sqrt{3}}}$