7. TULON NOLLASÄÄNTÖ

TEORIA

Tulon nollasääntö: **Tulo saa arvon nolla vain, jos jokin tulon tekijöistä on nolla**

ab = 0, jos a = 0 V b = 0

ESIMERKIT

Esim.

a) $x(x - 10) = 0$

$x = 0 \quad V \quad x - 10 = 0$

$x = 10$

b) $5x^2 = 20x$

$5x^2 - 20x = 0$

$5x(x - 4) = 0$

$5x = 0 \quad V \quad x - 4 = 0$

$x = 0 \quad V \quad x = 4$

TEHTÄVÄT

Ratkaise yhtälö

1. a) $(4x - 2)(10 - x) = 0$ b) $3(x - 8)(5 + 2x) = 0$
2. a) $(x - 7)(7 - 14x) = 0$ b) $(6x - 12)(30 + 15x) = 0$
3. a) $(a + 6)(8 + a) = a^2$ b) $(5y - 20) - (3y + 10) = 0$
4. a) $2x^2 - 30x = 0$ b) $10x^2 = 90x$
5. a) $7(x + 2)(x + 3) = 0$ b) $(y - 11)(2y - 18)(y + 5) = 0$
6. a) $(3x - 1)^2 = 1$ b) $\left(1 + \frac{1}{x}\right)\left(4 - \frac{16}{x}\right) = 0$
7. a) $(x^2 - 9)\left(x + \frac{1}{3}\right) = 0$ b) $(x - 2)(x + 3) = -6$
8. a) $x^2 - x = 0$ b) $-2x^2 = x$
9. a) $4x = 5x^2 + 4x - 5$ b) $(x - 11)^2 = 0$
10. a) $x^2 - 20x + 100 = 0$ b) $9x^2 + 6x + 1 = 0$

VASTAUKSET

1. a) $x = \frac{1}{2}$ V x = 10 b) x = 8 V $x = -2\frac{1}{2}$
2. a) x = 7 V $x = \frac{1}{2}$ b) x = 2 V x = -2
3. a) $x = -3\frac{3}{7}$ b) y = 15
4. a) x = 0 V x = 15 b) x = 0 V x = 9
5. a) x = -2 V X = -3 b) y = 11 V y = 9 V y = -5
6. a) x = 0 V $x = \frac{2}{3}$ b) x = -1 V x = 4
7. a) x = 3 V x = -3 V $x = -\frac{1}{3}$ b) x = 0 V x = -1
8. a) x = 0 V x = 1 b) x = 0 V $x = -\frac{1}{2}$
9. a) x = 1 V x = -1 b) x = 11
10. a) x = 10 b) $x = -\frac{1}{3}$