

MAA9

s2010

Mallivastaukset

(4.) a)

$$6x^2 - x - 2 = 0$$

$$x = \frac{-(-1) \pm \sqrt{(-1)^2 - 4 \cdot 6 \cdot (-2)}}{12} = \frac{1 \pm \sqrt{1+48}}{12} = \frac{1 \pm 7}{12} = \begin{cases} -\frac{1}{2} \\ \frac{2}{3} \end{cases}$$

$$\text{tulomuoto} = 6 \left(x + \frac{1}{2} \right) \left(x - \frac{2}{3} \right) = (2x+1)(3x-2)$$

$\begin{matrix} \nearrow & \searrow \\ -2 & -3 \end{matrix}$

b)

o.s. nolllak. $x^2 + 3x - 10 = 0 \rightarrow x = \frac{-3 \pm \sqrt{9 - 4 \cdot 1 \cdot (-10)}}{2} = \frac{-3 \pm \sqrt{49}}{2} = \frac{-3 \pm 7}{2}$

$$\frac{x^2 + 3x - 10}{3x + 15} = \frac{1(x-2)(x+5)}{3(x+5)} = \frac{x-2}{3}$$

$$= \begin{cases} 2 \\ -5 \end{cases}$$

$$3. a) \quad \underbrace{|2-\sqrt{3}|}_{>0} - \underbrace{|2\sqrt{3}-5|}_{<0} + 3 \underbrace{|1-\sqrt{3}|}_{<0} =$$

$$(2-\sqrt{3}) + (2\sqrt{3}-5) - 3(1-\sqrt{3}) = 2-\sqrt{3}+2\sqrt{3}-5-3+3\sqrt{3} = -6+4\sqrt{3}$$

$$b) \quad x^2 + 3x + 2 < 0$$

$$x^2 + 3x + 2 = 0 \Rightarrow x = \frac{-3 \pm \sqrt{3^2 - 4 \cdot 1 \cdot 2}}{2} = \frac{-3 \pm 1}{2} = \begin{cases} -2 \\ -1 \end{cases}$$



$$V: -2 < x < -1 \quad \text{tai} \quad]-2, -1[$$

1.

$$a) \quad \frac{x}{6} - \frac{x-2}{3} = \frac{5}{12} \quad | \cdot 12 \rightarrow 2x - 4(x-2) = 5 \rightarrow -2x = 5-8 \quad || : (-2) \rightarrow x = -\frac{13}{2}$$

$$b) \quad 2x^2 - x - 1 = 0 \rightarrow x = \frac{1 \pm \sqrt{1+8}}{4} = \begin{cases} 1 \\ -\frac{1}{2} \end{cases}$$

c) Tulon nollasääntö!

$$\underline{x=0} \quad \text{tai} \quad \underline{2x+3=0} \quad x = -\frac{3}{2}$$

$$\text{tai} \quad \underline{1-x=0} \quad x=1$$

$$\text{tai} \quad \underline{-x+2=0} \quad x=2$$

② a) $\frac{3(1-x)}{1} - \frac{5x+2}{4} = \frac{12(1-x) - (5x+2)}{4} = \frac{-17x+10}{4}$

b) $x^2 + y^2 = \left(\frac{1-t^2}{1+t^2}\right)^2 + \left(\frac{2t}{1+t^2}\right)^2 = \frac{1-2t^2+t^4+4t^2}{(1+t^2)^2} = \frac{t^4+2t^2+1}{(1+t^2)^2} = \frac{(t^2+1)^2}{(1+t^2)^2} = 1$

$a^2+2ab+b^2 = (a+b)^2$
 $\downarrow$
 $\frac{(t^2+1)^2}{(1+t^2)^2} = 1$

⑤ $3x^2 + ax + 1 > 0$

ylös. ank.
 aina > 0
 kun kuvaaja $\rightarrow$

 eli $D < 0$

$$D = b^2 - 4ac = a^2 - 12 < 0$$

$$a^2 - 12 < 0$$

$$a = \pm \sqrt{12}$$



$$V: -\sqrt{12} < a < \sqrt{12}$$

⑥ $(x-2)(x-1) - 12 = 0$

$$x^2 - 3x + 2 - 12 = 0$$

$$x^2 - 3x - 10 = 0$$

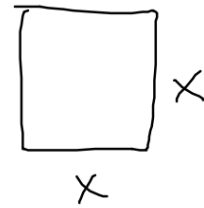
$$x = \frac{3 \pm \sqrt{9 - 4 \cdot 1 \cdot (-10)}}{2 \cdot 1} = \frac{3 \pm 7}{2} = \begin{cases} 5 \\ -2 \end{cases}$$

7.

$x = \text{square pit.}$

$$45x^2 + 65 \cdot 4x = 10000$$

$\uparrow$ $\uparrow$
area pit.



$$45x^2 + 260x - 10000 = 0$$

a b c

$$x = \frac{-260 \pm \sqrt{260^2 - 4 \cdot 45 \cdot (-10000)}}{90} = \frac{-260 \pm 1366,6}{90} \approx \begin{cases} 12,296 \\ -12,07 \end{cases}$$

$$V: \quad h. \quad \underline{\underline{12,3 \text{ m}}}$$