

1. a) $1^{\circ} \sqrt[4]{5x+1}$; $5x+1 \geq 0 \Leftrightarrow 5x \geq -1 \quad | :5 > 0 \Leftrightarrow x \geq -\frac{1}{5}$ (parillinen juuri)
 $2^{\circ} \sqrt[5]{x-1}$; $x \in \mathbb{R}$ (pariton juuri)

b) $f(x) = \sqrt[4]{x} : 2$; $g(x) = \sqrt[3]{x+1} : 4$; $h(x) = \sqrt[6]{2-x} + 1 : 1$; $i(x) = \sqrt[5]{3-x} : 3$

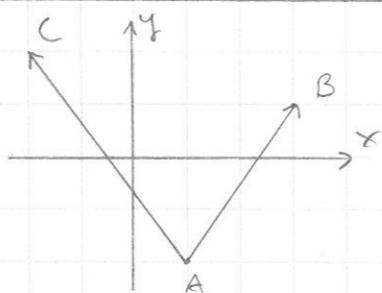
2. a) $\frac{3x^2+2x}{x} = \frac{x(3x+2)}{x} = 3x+2, x \neq 0$

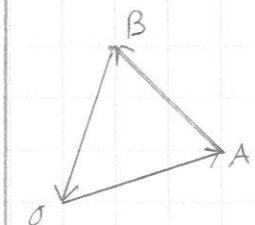
b) $\frac{x^2-25}{2x-10} = \frac{(x-5)(x+5)}{2(x-5)} = \frac{x+5}{2}, x \neq 5$

c) $\frac{x^2/2}{2x+1} - \frac{2x+1}{x-2} = \frac{2(x-2) - (2x+1)}{(2x+1)(x-2)} = -\frac{5}{(2x+1)(x-2)}, x \neq -\frac{1}{2}, x \neq 2$

3. $\frac{1}{x+3} = \frac{3x+6}{(x+3)(x+4)} \quad | \cdot (x+3)(x+4) \neq 0, x \neq -3, x \neq -4$
 $\Leftrightarrow x+4 = 3x+6 \quad \Leftrightarrow -2x = 2 \quad | :(-2) \neq 0 \Leftrightarrow x = -1$ } kany
Vast. $x = -1$

4. $\sqrt{x-4} + 9 = 2x, x-4 \geq 0 \Leftrightarrow x \geq 4$
 $\Leftrightarrow \sqrt{x-4} = 2x-9 \quad | (\)^2$
 $\Leftrightarrow (\sqrt{x-4})^2 = (2x-9)^2$
 $\Leftrightarrow x-4 = (2x)^2 - 2 \cdot 2x \cdot 9 + 9^2 \Leftrightarrow x-4 = 4x^2 - 36x + 81$
 $\Leftrightarrow 0 = 4x^2 - 37x + 85 = 0 \Leftrightarrow x = \frac{37 \pm \sqrt{(-37)^2 - 4 \cdot 4 \cdot 85}}{8} = \frac{37 \pm 3}{8} = \begin{cases} 5 \\ \frac{17}{4} \end{cases}$
 Tark. $x=5: \sqrt{5-4} + 9 = 2 \cdot 5 \Leftrightarrow 1+9 = 10 \checkmark$
 $x = \frac{17}{4}: \sqrt{\frac{17}{4}-4} + 9 = 2 \cdot \frac{17}{4} \Leftrightarrow \frac{1}{2} + 9 = \frac{17}{2} \checkmark$
Vast. $x = 5$

5.  $A = (1, -2), B = (3, 1), \vec{AC} = -3\vec{i} + 4\vec{j}, \vec{a} = 5\vec{i} + 4\vec{j}$
 a) $\vec{AB} = (3-1)\vec{i} + (1-(-2))\vec{j} = 2\vec{i} + 3\vec{j}$
 $|\vec{AB}| = \sqrt{2^2 + 3^2} = \sqrt{13}$
 b) $C = (1-3, -2+4) = (-2, 2)$
 c) $\vec{a} \cdot \vec{AC} = 5 \cdot (-3) + 4 \cdot 4 = 1 \neq 0 \Rightarrow \vec{a} \not\perp \vec{AC}$

6.  $\vec{OA} = 7\vec{i} - 2\vec{j}, \vec{AB} = -3\vec{i} + 9\vec{j}$
 $\vec{BO} = -\vec{AB} - \vec{OA} = -(-3\vec{i} + 9\vec{j}) - (7\vec{i} - 2\vec{j}) = -4\vec{i} - 7\vec{j}$
 $|\vec{BO}| = \sqrt{(-4)^2 + (-7)^2} = \sqrt{65} \approx 8,06 \approx 8,1 \text{ (km)}$