

1.  $x^3 - x - 6 = 0$

$x = 2$  on polynomien 0-rakke  $\Rightarrow x - 2$  on polynomien tekijä

$$\begin{array}{r} x^2 + 2x + 3 \\ x-2 \overline{) x^3 \quad -x - 6} \\ \underline{-(x^3 - 2x^2)} \phantom{)} \\ 2x^2 - x - 6 \\ \underline{-(2x^2 - 4x)} \phantom{)} \\ 3x - 6 \\ \underline{-(3x - 6)} \\ 0 \end{array} \quad \begin{array}{l} \frac{x^3}{x} = x^2 \\ \frac{2x^2}{x} = 2x \\ \frac{3x}{x} = 3 \end{array}$$

$\Rightarrow (x-2)(x^2+2x+3) = 0$

$\Rightarrow x-2 = 0$  tai  $x^2+2x+3 = 0$

$D = 2^2 - 4 \cdot 1 \cdot 3 = 4 - 12 = -8 < 0 \Rightarrow$  ei ratk.

$\Rightarrow \underline{x = 2}$

TAI:  $x^3 - x - 6 = (x-2)(x^2 + ax + 3)$

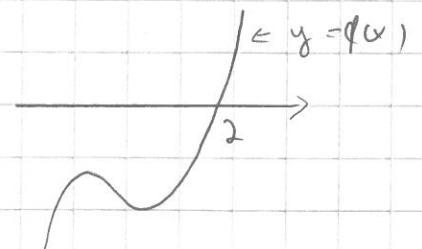
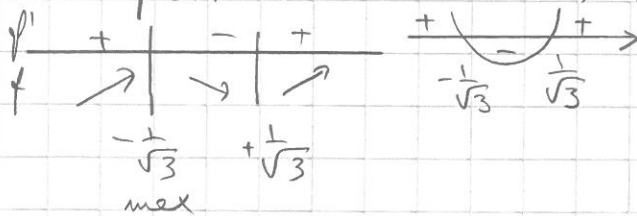
$$\begin{aligned} &= x^3 + ax^2 + 3x - 2x^2 - 2ax - 6 \\ &= x^3 + \underline{(a-2)x^2} + \underline{(3-2a)x} - 6 \end{aligned}$$

$\Rightarrow \begin{cases} 0 = a-2 & \Rightarrow a=2 \\ -1 = 3-2a & \Rightarrow a=2 \end{cases}$

TAI:  $x^3 - x - 6 = 0$

$= f(x)$ ,  $f$  jalk. ja derivo. R:  $\mathbb{R}$

$f'(x) = 3x^2 - 1 = 0 \Leftrightarrow x^2 = \frac{1}{3} \quad (\sqrt{\quad}) \Rightarrow x = \pm \frac{1}{\sqrt{3}}$



$f(-\frac{1}{\sqrt{3}}) \approx -5,6 < 0$

$f$  in kulkuvuorossa

$\Rightarrow f$ :llä on korkeintaan 1 0-rakke

$f(2) = 0 \Rightarrow \underline{x = 2}$