Nullstellen

a) $f(x) = \frac{1}{2}x^2 - 3x = 0$

$= 0{,}5x^2 - 3x = 0$

$(0{,}5x - 3) \cdot x = 0$

$0{,}5x - 3 = 0 \quad |+3$

$0{,}5x = 3 \quad |:0{,}5$

$x = 6 \qquad x = 0 \qquad (0;6)$
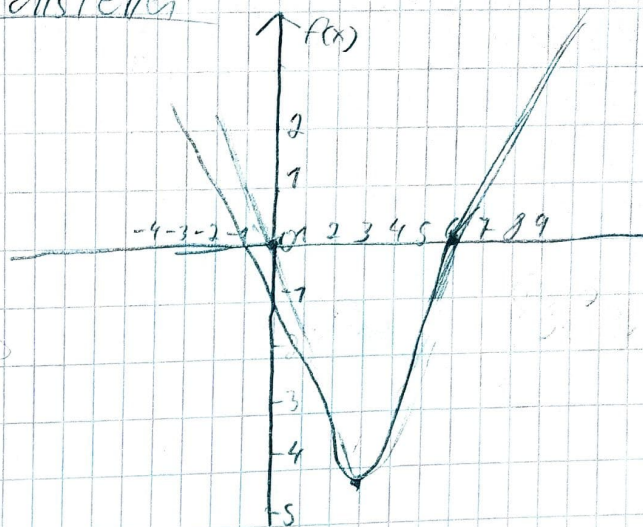
b) $f(x) = \frac{1}{2}x^4 + x^3$

$0{,}5 \cdot x^4 + x^3 = 0$

$(0{,}5x + 1) \cdot x^3 = 0$

$0{,}5x + 1 = 0 \quad |-1$

$0{,}5x = -1 \quad |:0{,}5$

$x = -2$

$(-2;0)$
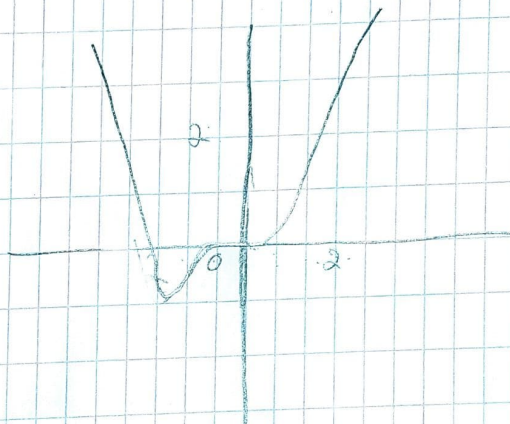
c) $f(x) = -x^4 + 6x^3 - 9x^2$

$(-x^2 + 6x - 9) \cdot x^2 = 0$

$-x^2 + 6x - 9 = 0 \quad |+9$

$-x^2 + 6x = 9 \quad |\cdot -1$

$x^2 - 6x = -9$

$x^2 - 6x + (-3)^2 = (-3)^2 - 9$

$x^2 - 6x + (-3)^2 = 9 - 9$

$= 0$

$(x-3)^2 = 0$

$x - 3 = \sqrt{0}$

$x - 3 = 0$
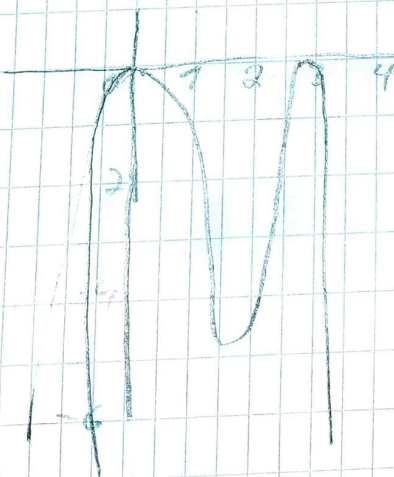
$x = 3 \qquad (0;3)$

d.) $f(x) = \frac{1}{2}x^2 - \frac{1}{2}x - 3$

$0,5x^2 + -\frac{1}{2} \cdot x - 3 = 0 \quad | +3$

$0,5x \cdot x^2 - 0,5x = 3 \quad | :0,5$

$x^2 - x = 6$

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

$x^2 - x + \left(-\frac{1}{2}\right)^2 = (-0,5)^2 + 6$

$x^2 - x + \left(-\frac{1}{2}\right)^2 = 0,25 + 6$

$x^2 - x + \left(\frac{1}{2}\right)^2 = 6,25$

$(x - \frac{1}{2})^2 = 6,25$

$x - \frac{1}{2} = \pm\sqrt{6,25}$

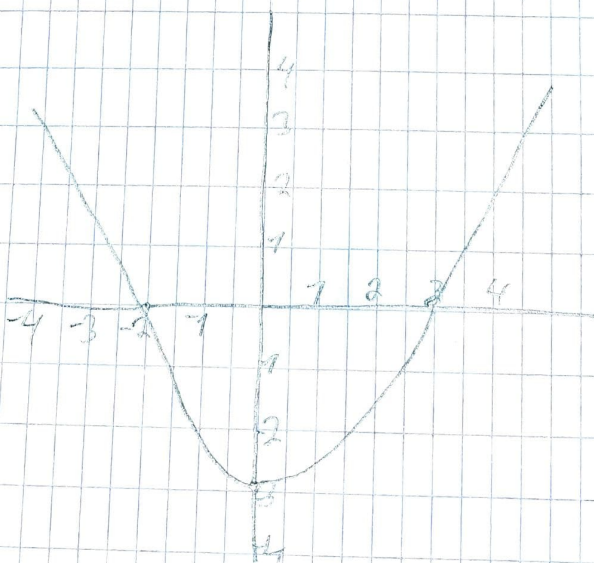$x_1 - 0,5 = \sqrt{6,25}$ $\qquad$ $x_2 - \frac{1}{2} = -\sqrt{6,25}$

$x_1 = 0,5 = 2,5$ $\qquad\quad$ $x_2 - 0,5 = -\sqrt{6,25}$

$x_1 = 3$ $\qquad\qquad\quad$ $x_2 - 0,5 = -2,5$

$\qquad\qquad\qquad\qquad$ $x_2 = -2$

$\qquad\qquad(-2 ; 3)$

Hendrik
Heinz

a) $\int_0^6 (\frac{1}{2}x^2 - 3x)\,dx \quad \left[\frac{0,5}{3}x^3 - \frac{3}{2}x^2 + c\right]_0^6$

$\frac{0,5}{3}\cdot 6^3 - \frac{3}{2}\cdot 6^2 + c - \frac{0,5}{3}0^3 - \frac{3}{2}\cdot 0^2 + c$

$(36 - 54) - (0 - 0)$

$-18 - 0 = -18\,FE$

b) $\int_0^2 (\frac{1}{2}x^4 + x^3)\,dx \quad \left[\frac{0,5}{5}x^5 + \frac{1}{4}x^4\right]_0^{-2}$

$\left(\frac{0,5}{5}\cdot(-2)^5 + \frac{1}{4}(-2)^4\right) - \left(\frac{0,5}{5}\cdot 0^5 + \frac{1}{4}\cdot 0^4\right)$

$\frac{4}{5} - 0 = \frac{4}{5}\,FE$

c) $\int_3^0 (-x^4 + 6x^3 - 9x^2)\,dx \quad \left[\frac{1}{5}x^5 + \frac{6}{4}x^4 - \frac{9}{3}x^3 + c\right]$

$-8,4 - 0 = 8,1\,FE$